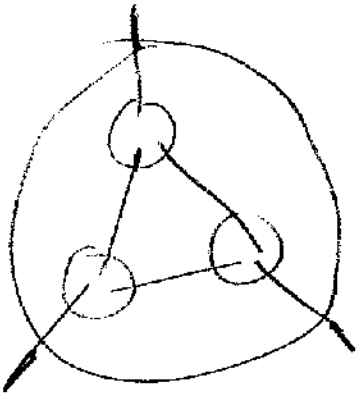
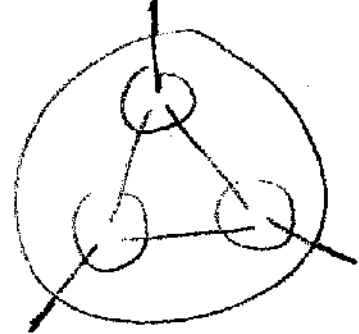
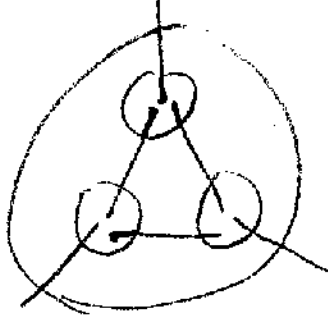
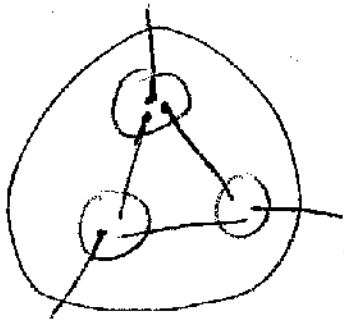
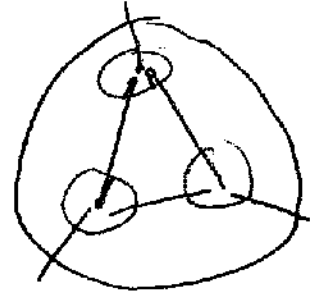
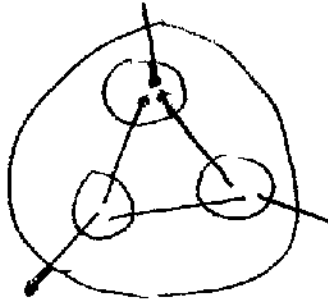
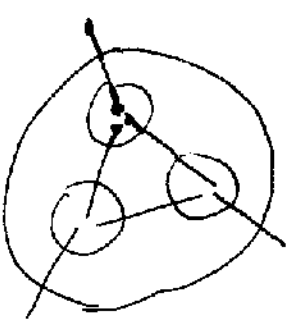


$z^+$

three nodes in one circle

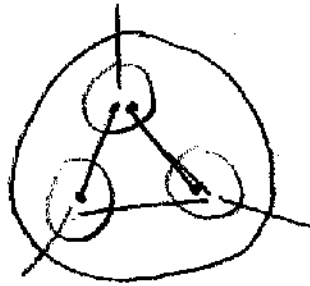
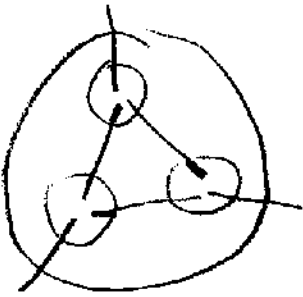
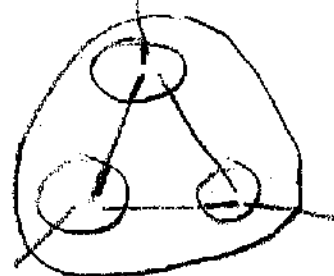
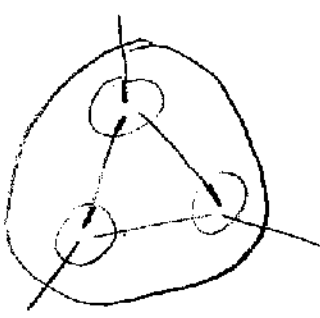


never has only one pairing

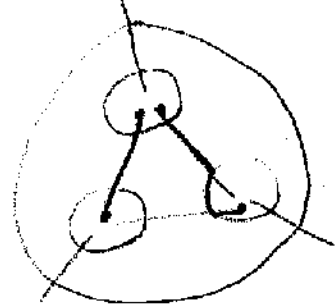
272

2-nodes in 1-circle, 1 in 2 other circles

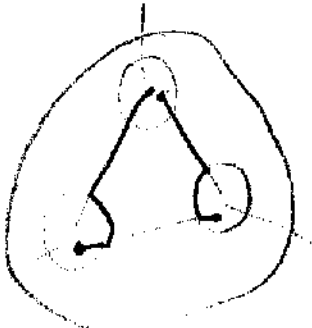
all inner circles



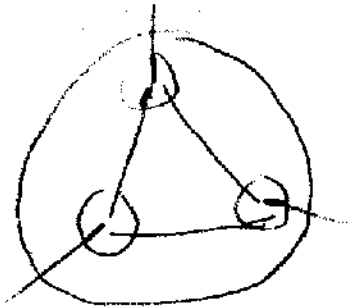
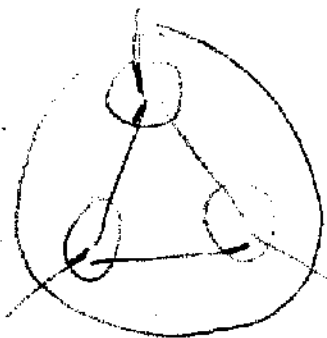
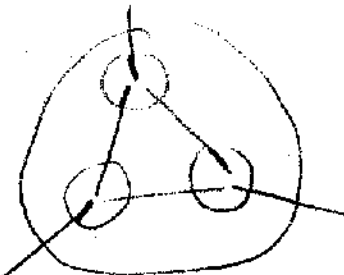
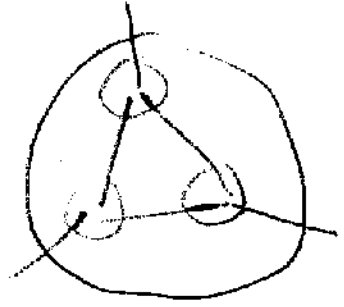
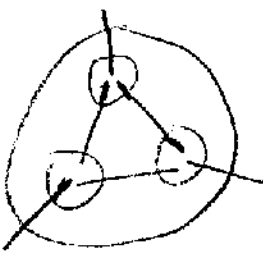
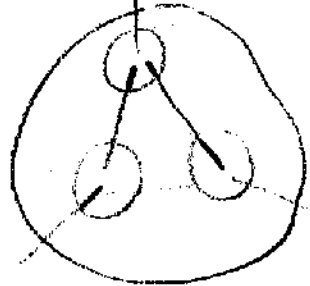
det(1,6;2,5)  
from inner A



det(1,6;2,4)  
from inner A

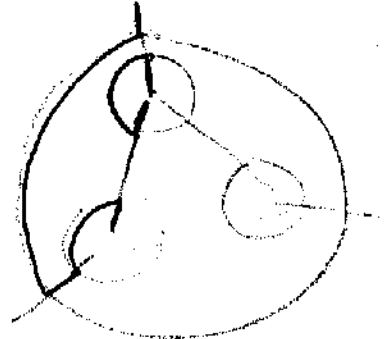
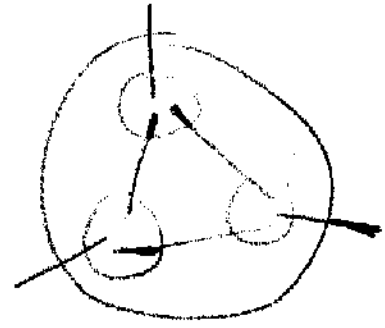
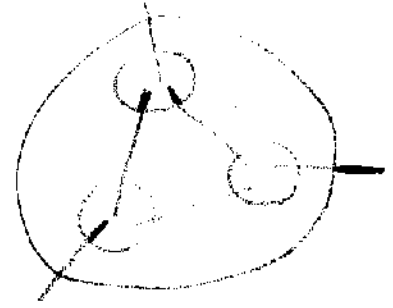
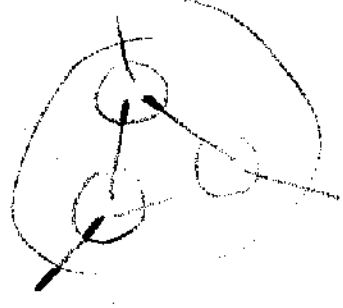
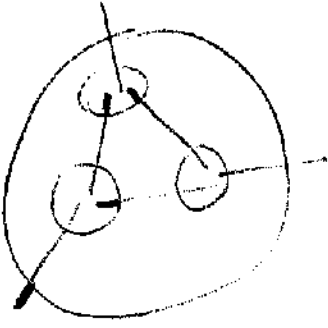
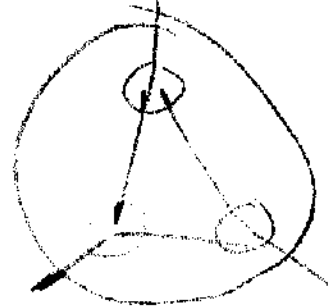
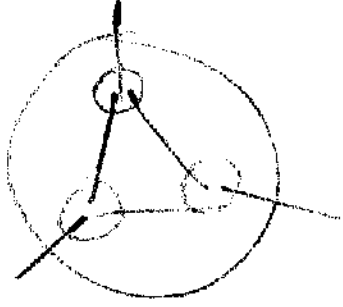
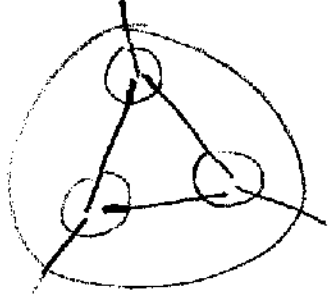
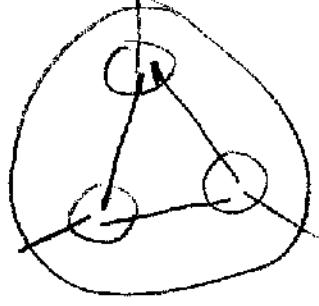
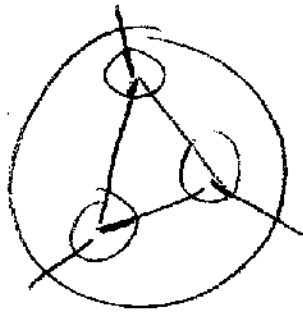
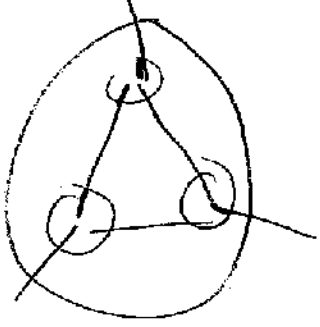


det(1,2;5,4)  
from inner A

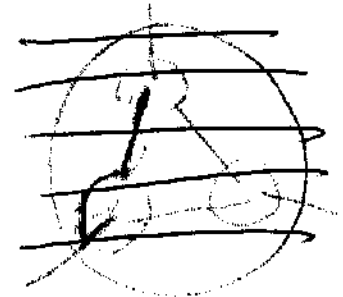
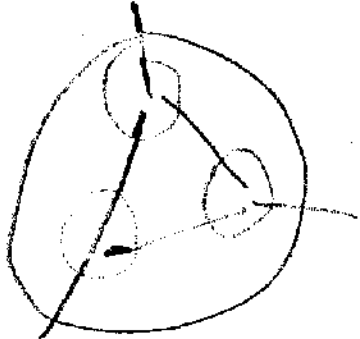


272

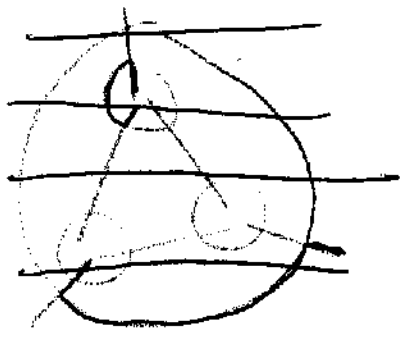
2 in unia (a)  
1 in unia  
1 in unia



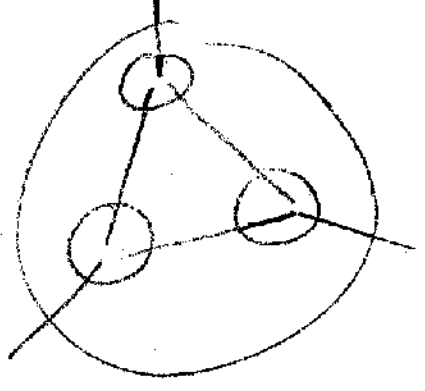
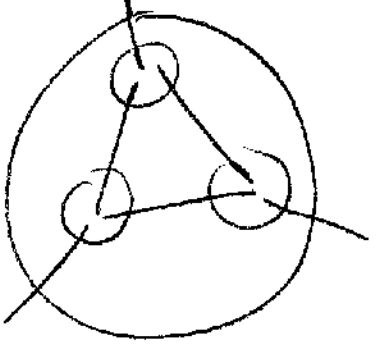
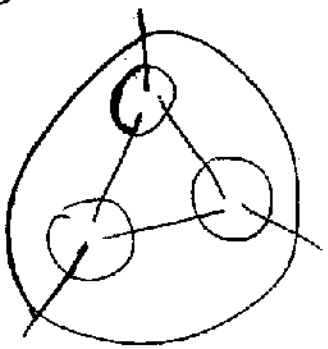
det(1,2;7,10)



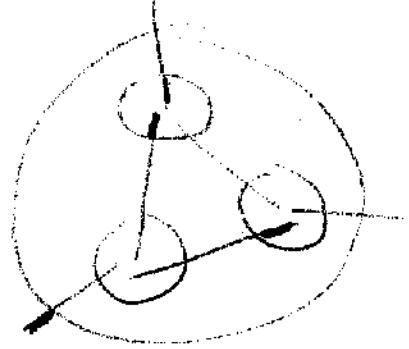
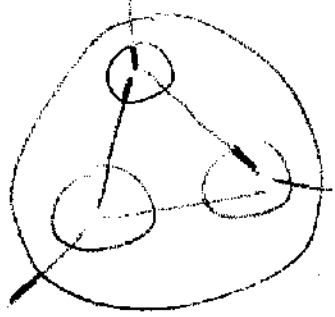
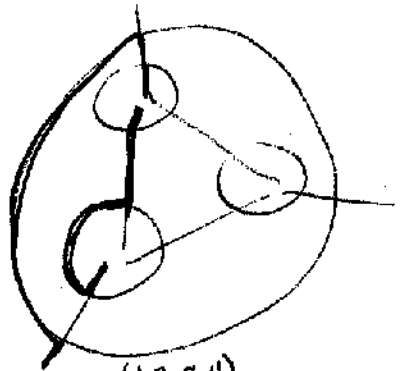
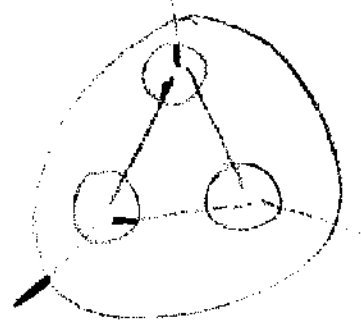
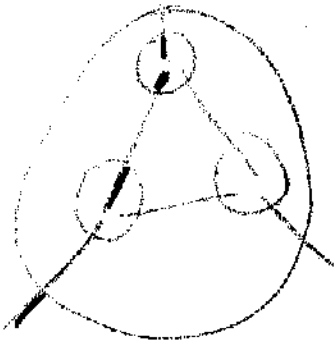
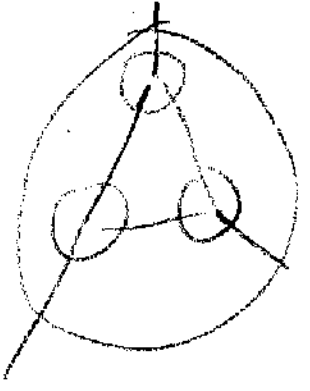
~~det(1,8;9,11)~~



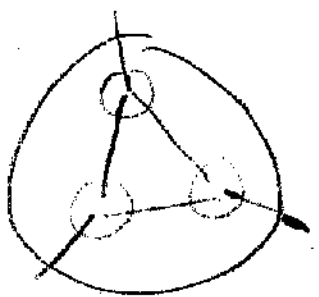
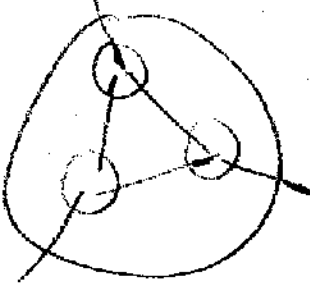
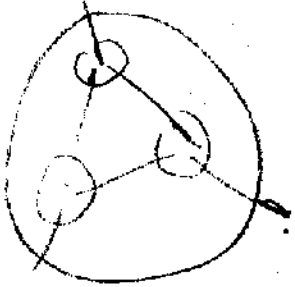
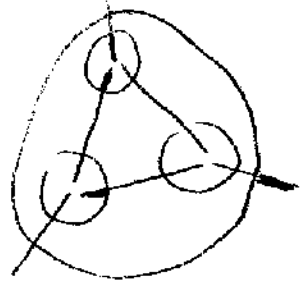
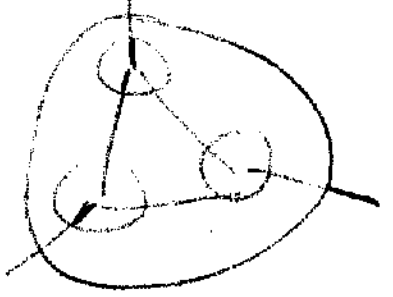
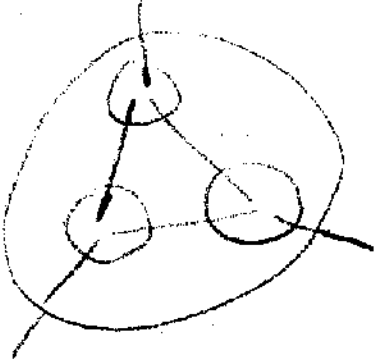
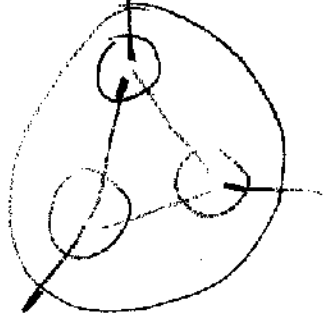
~~det(1,8;9,11)~~



det(1,8;7,10)

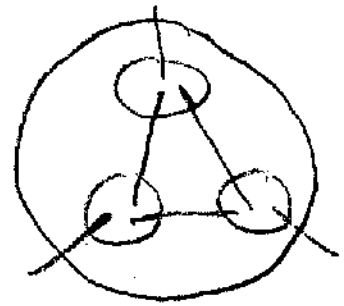
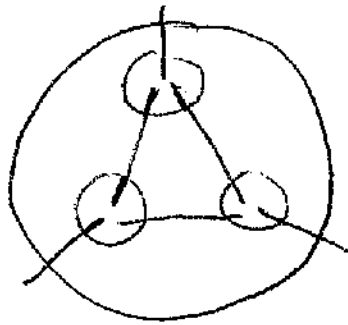
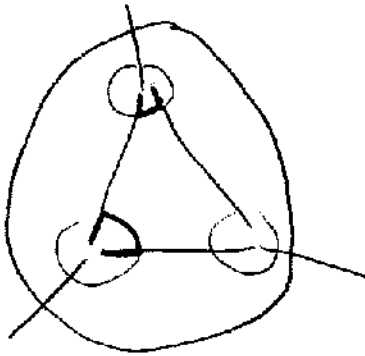


det(1,9;8,11)

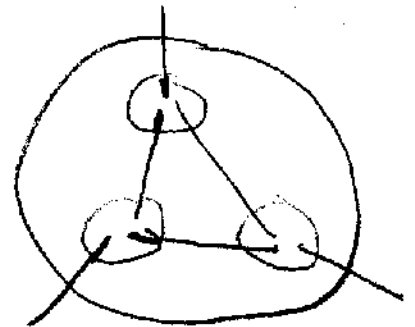
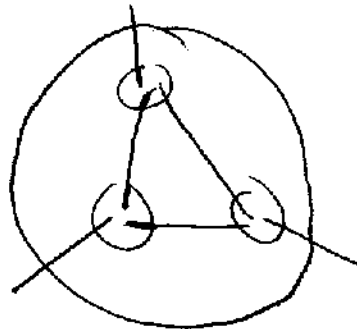
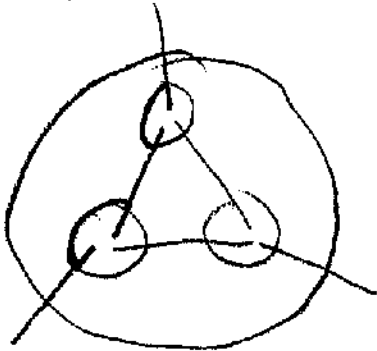


2+2

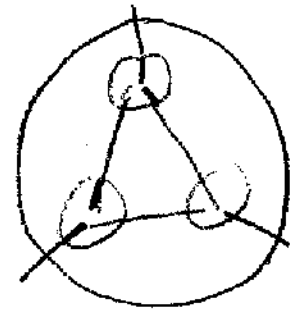
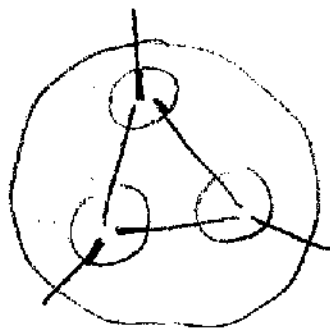
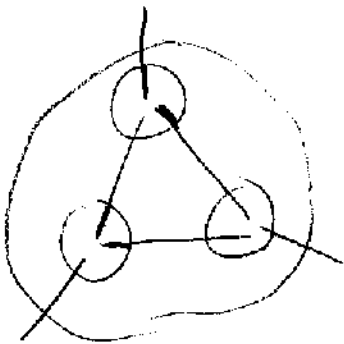
2 nodes in 2 different circles



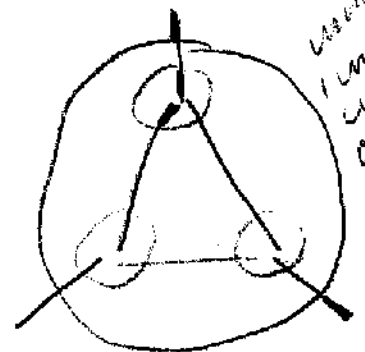
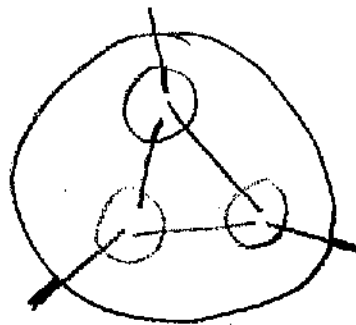
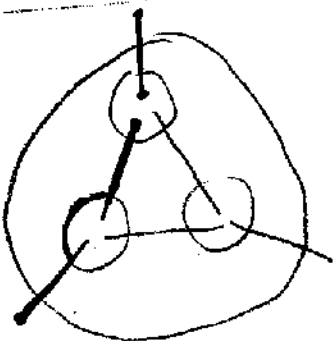
det(1,2;6,3)  
from inner Δ



det(1,7;2,8)

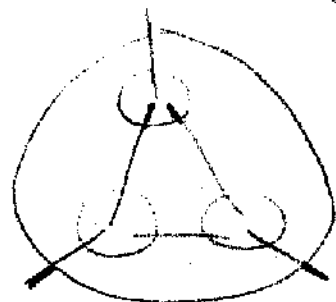
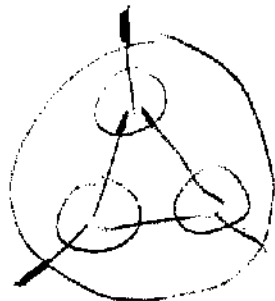


using 2 inner circles



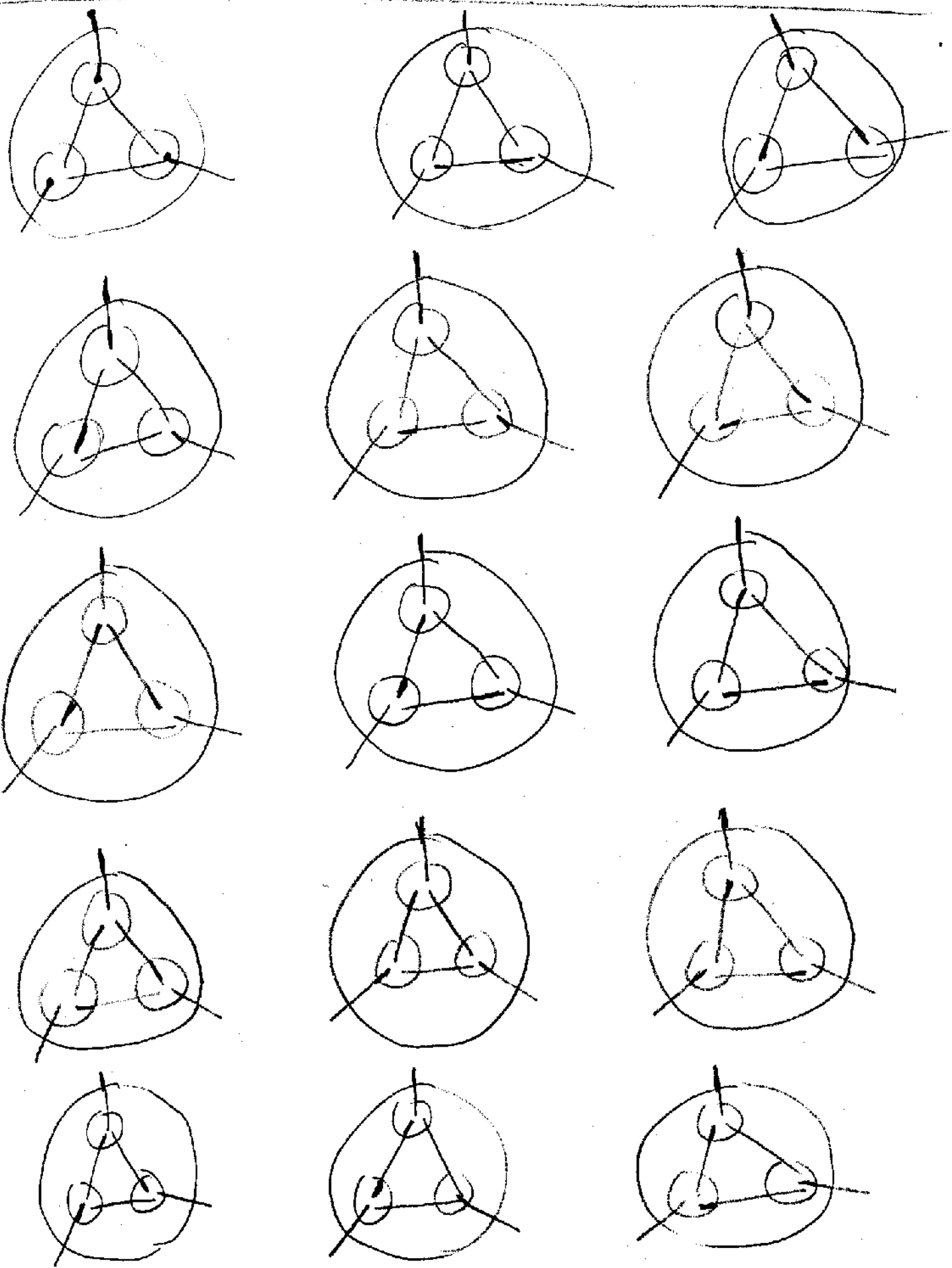
using 1 inner circle, order circle

det(1,7;11,10)



2+2

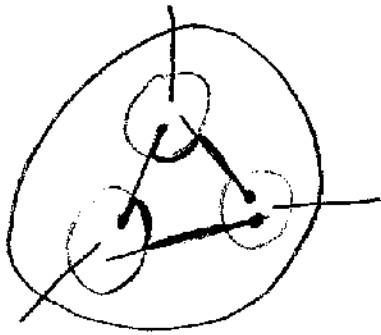
one node in each of four circles



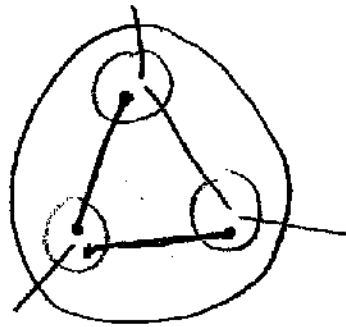
never has only one, pair in all

2+2

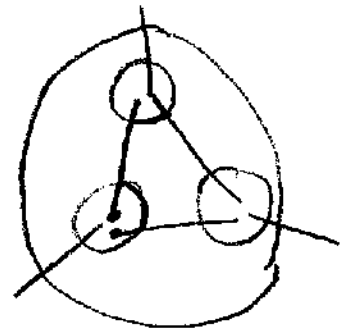
all 4 nodes on 'inner triangle'



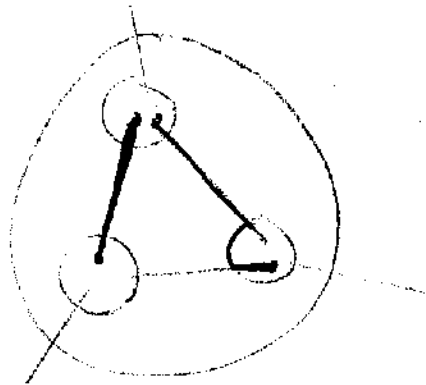
det(1,2;5,4)



det(1,4;2,3)



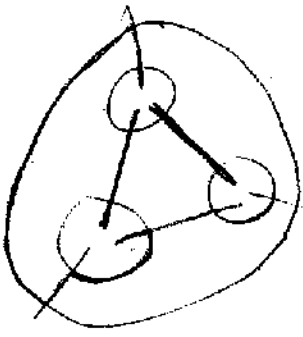
det(1,2;6,3)



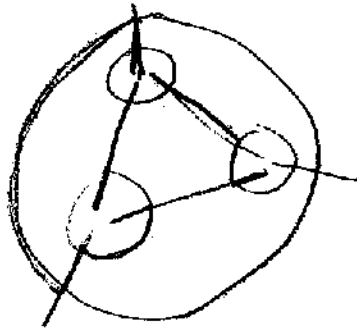
det(1,6;2,4)

always has one pairing!!

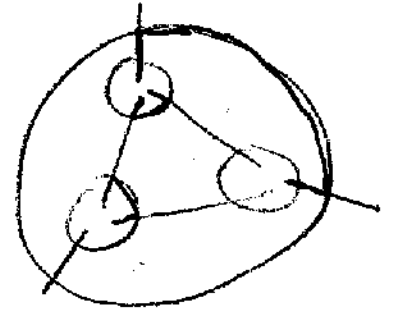
3-3 3 nodes in one circle, 2 in one, 1 in one.



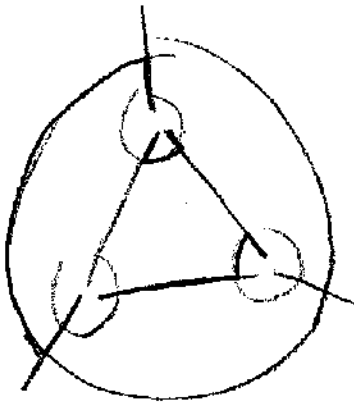
$$\det(1,7,6; 2,3,5) < 0$$



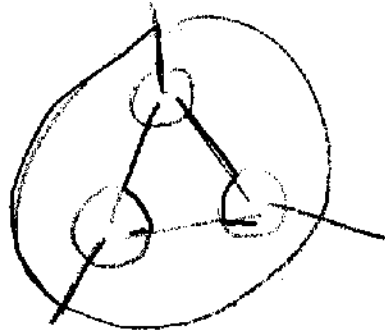
$$\det(1,7,6; 2,3,4) < 0$$



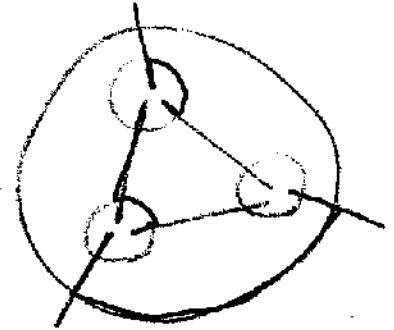
$$\det(1,2,7; 3,6,9) > 0$$



$$\det(5,6,7; 1,3,8) > 0$$



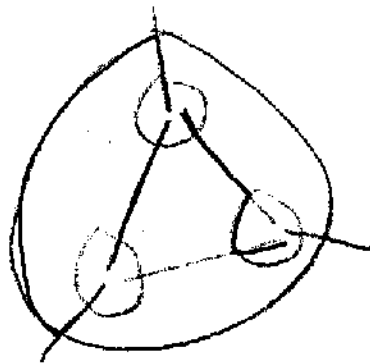
$$\det(1,6,7; 3,4,8) < 0$$



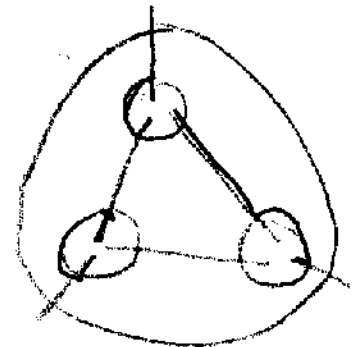
$$\det(1,7,8; 3,6,9) < 0$$



$$\det(1,4,7; 2,5,8) < 0$$



$$\det(1,4,7; 2,4,8) < 0$$



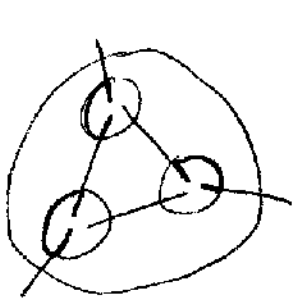
$$\det(1,2,6; 7,8,9)$$

all can have only one pairing!!

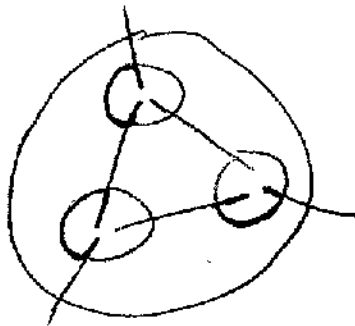


3<sup>rd</sup> 2 nodes in one circle, 2 in 2 others

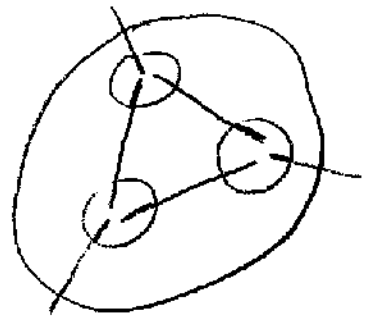
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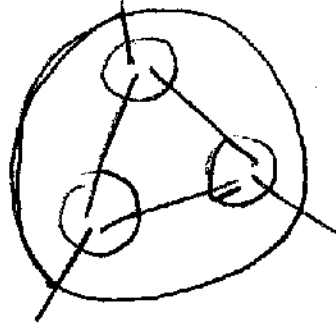
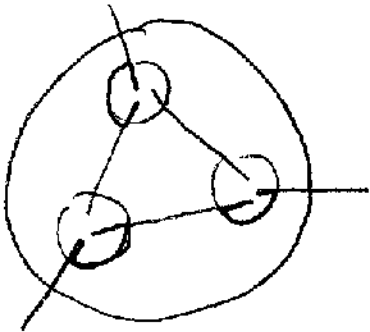
$$\det(1,2,5;7,8,9) < 0$$



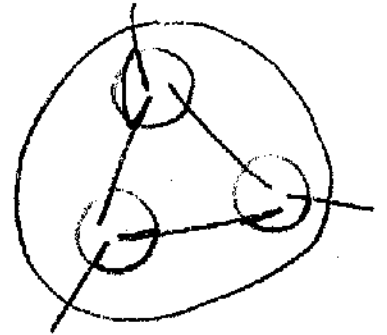
$$\det(1,2,4;7,8,9) < 0$$



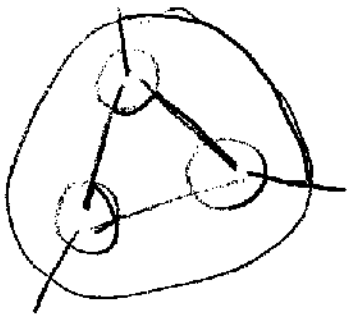
$$\det(1,5,7;2,4,8) < 0$$



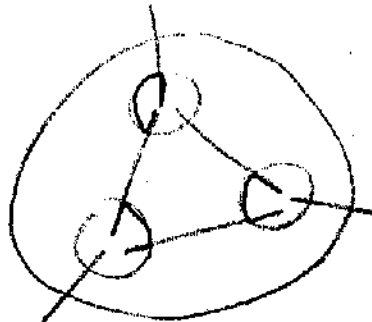
$$\det(3,4,8;1,5,7) < 0$$



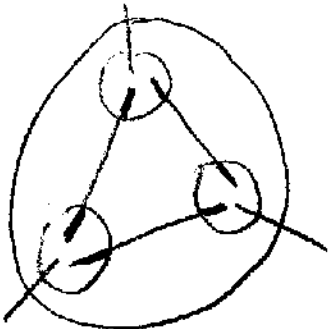
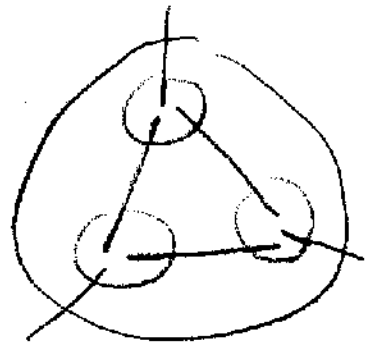
$$\det(1,3,8;4,7,9) > 0$$



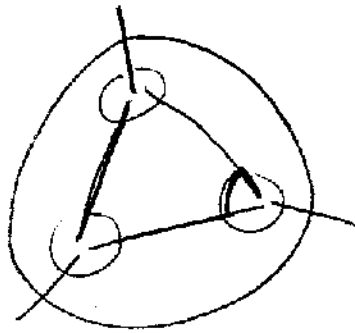
$$\det(1,2,7;3,5,9) > 0$$



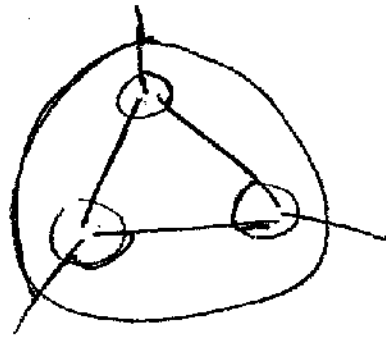
$$\det(1,2,5;3,4,7) < 0$$



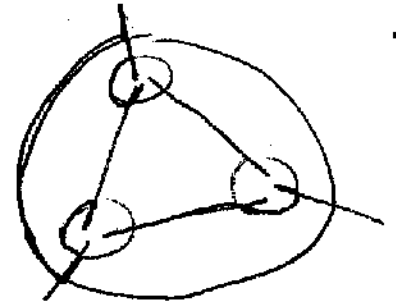
2 nodes in two circles, 1 in two circles ①



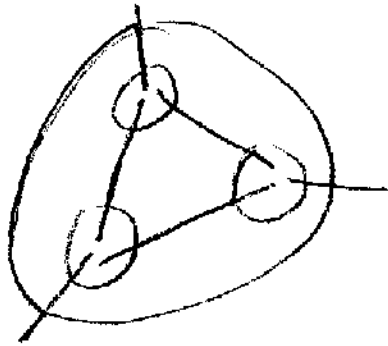
$$\det(1,5,7; 2,3,10) < 0$$



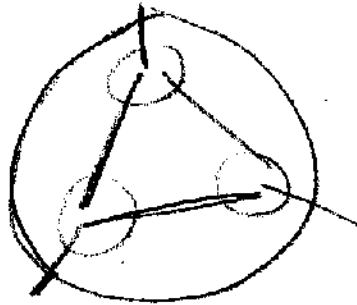
$$\det(2,3,4; 1,7,10) > 0$$



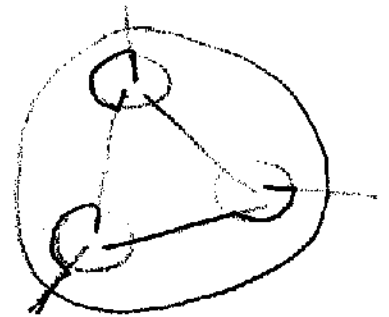
$$\det(1,2,3; 7,9,10) > 0$$



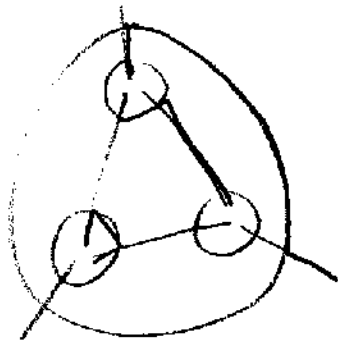
$$\det(1,5,7; 2,3,11) < 0$$



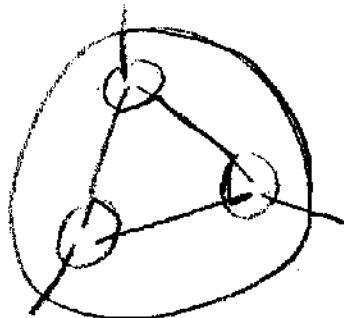
$$\det(2,3,11; 1,4,7) < 0$$



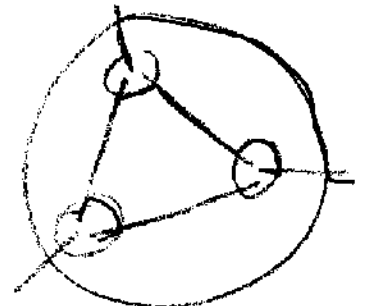
$$\det(1,2,3; 7,9,11) > 0$$



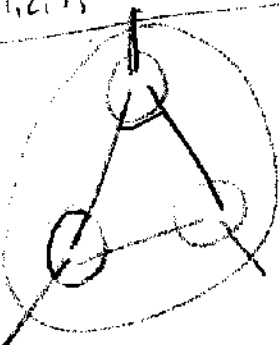
$$\det(1,2,7; 3,5,12) > 0$$



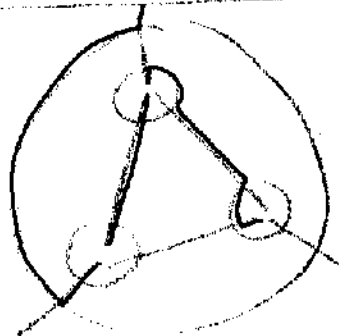
$$\det(1,2,7; 3,4,12) > 0$$



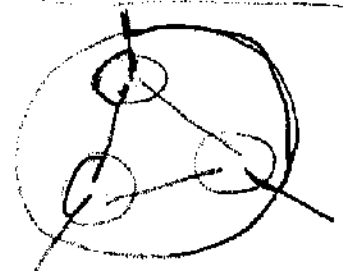
$$\det(1,2,7; 3,9,12) > 0$$



$$\det(1,2,7; 5,8,10) < 0$$

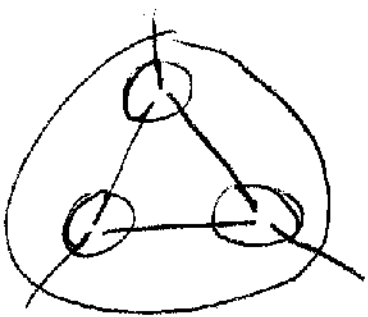


$$\det(2,1,8; 1,7,10) < 0$$

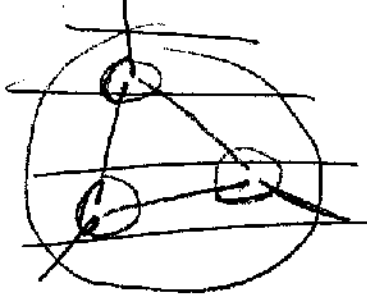


$$\det(1,2,9; 7,8,10) < 0$$

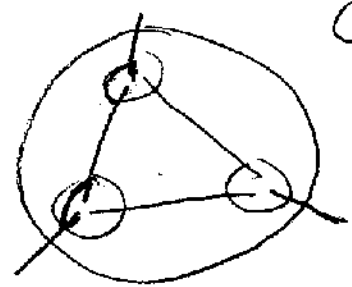
3x3



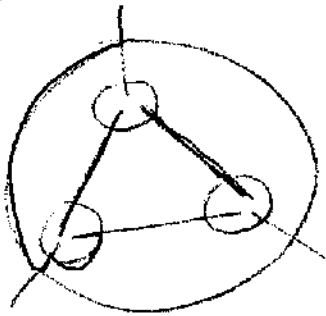
$$\det(1,2,5; 7,8,12) < 0$$



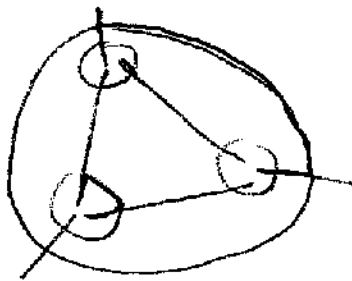
~~$$\det(1,2,4; 7,8,12) < 0$$~~



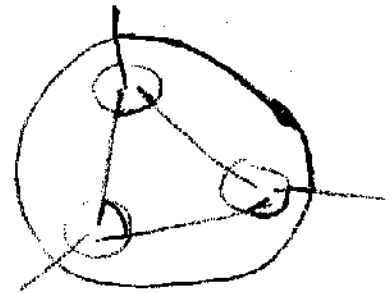
$$\det(1,2,9; 7,8,12) < 0$$



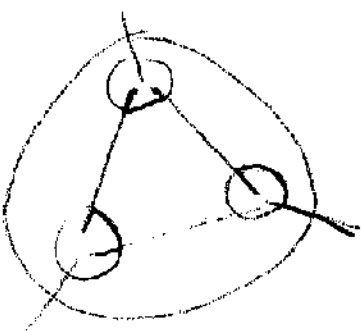
$$\det(1,6,10; 2,3,5) < 0$$



$$\det(1,2,10; 3,6,9) > 0$$



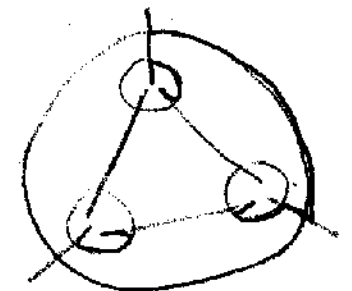
$$\det(1,2,10; 3,4,6) < 0$$



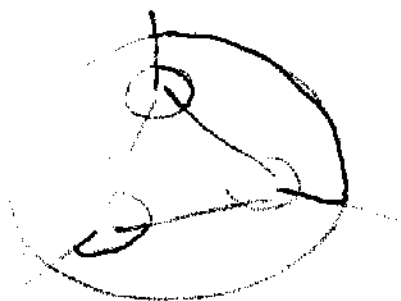
$$\det(1,2,12; 3,5,6) < 0$$



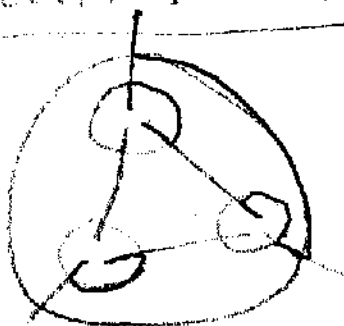
$$\det(1,2,12; 3,6,9) > 0$$



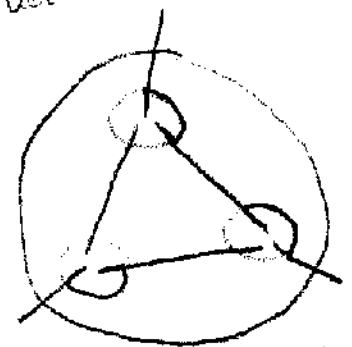
$$\det(3,4,6; 7,8,10) < 0$$



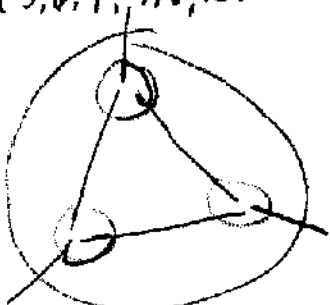
$$\det(3,6,9; 7,8,10) > 0$$



$$\det(3,5,6; 7,8,10) < 0$$



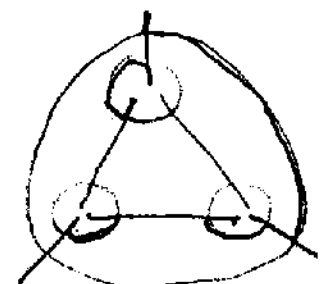
$$\det(3,5,6; 7,8,12) < 0$$



$$\det(3,6,9; 7,8,10) > 0$$



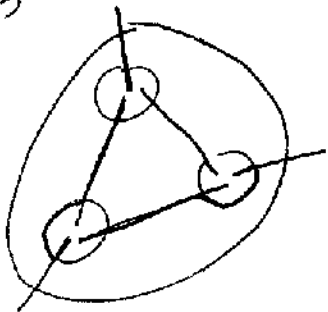
$$\det(1,5,10; 3,7,8) > 0$$



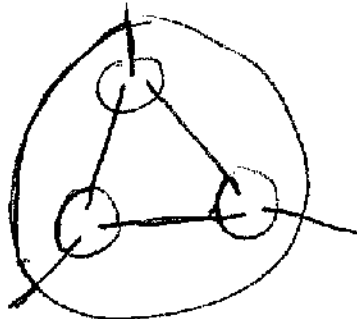
$$\det(1,3,8; 7,8,10) < 0$$

3x3

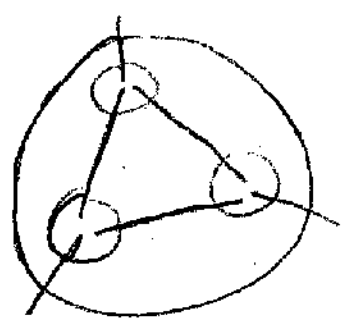
(3



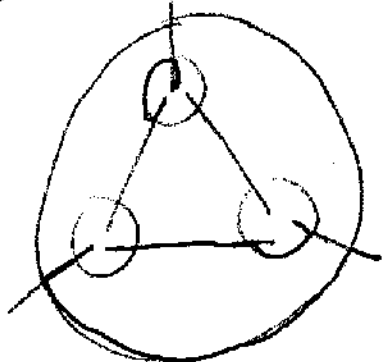
$$\det(1,3,7; 8,9,10) < 0$$



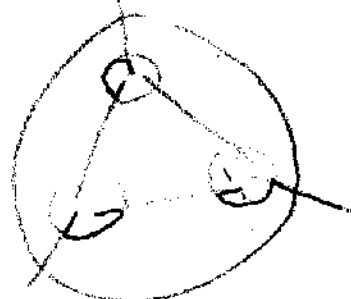
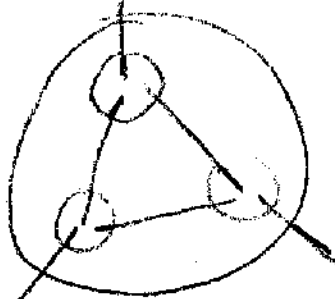
$$\det(1,5,7; 5,8,11) > 0$$



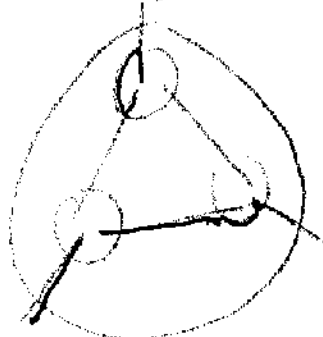
$$\det(1,4,7; 3,8,11) > 0$$



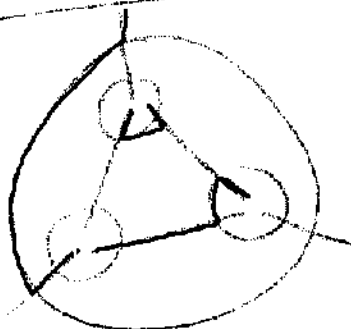
$$\det(1,3,8; 7,9,12) < 0$$



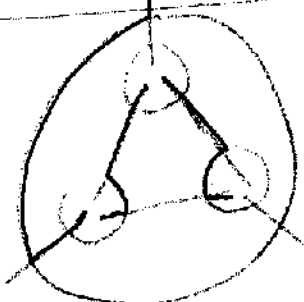
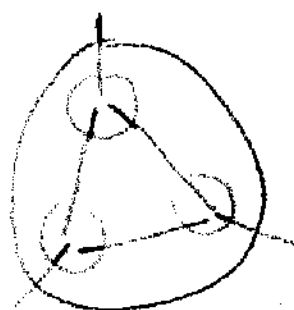
$$\det(1,3,4; 7,8,12) < 0$$



$$\det(1,3,8; 7,9,11) < 0$$



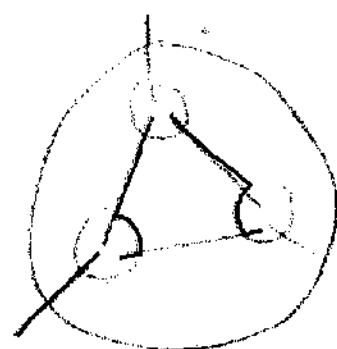
$$\det(1,3,8; 5,6,10) > 0$$



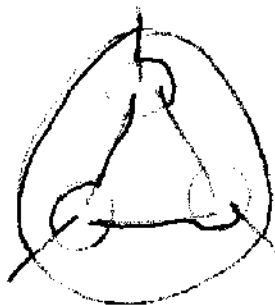
$$\det(1,6,9; 3,4,8) < 0$$



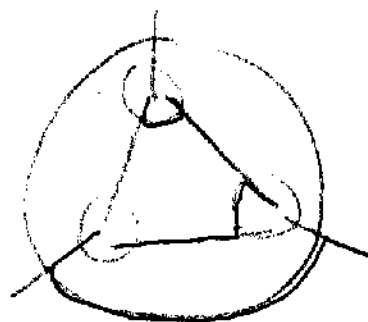
$$\det(1,5,6; 3,9,11) > 0$$



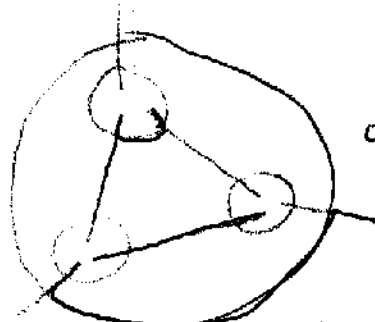
$$\det(1,6,11; 3,4,8) < 0$$



$$\det(1,6,9; 3,8,11) < 0$$



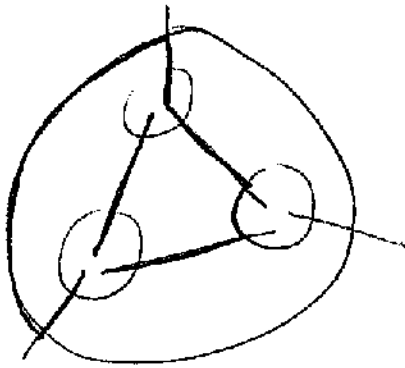
$$\det(1,3,8; 5,6,7) > 0$$



$$\det(1,6,8; 4,6,12) > 0$$

over

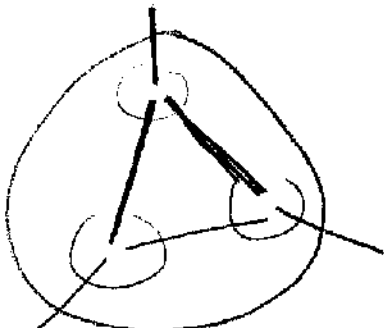
3x3 3 nodes in one circle, 3 nodes in another



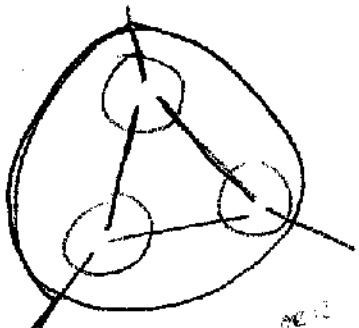
$$\det(1,6,7; 2,3,8) < 0$$

always only one pairing!

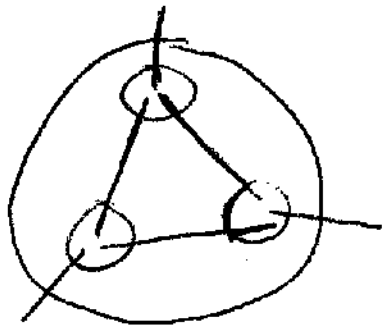
3x3 3 nodes in 1 circle, 1 in 3 others



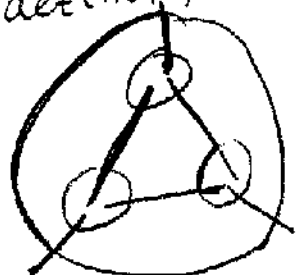
$$\det(1,6,7; 2,5,10) < 0$$



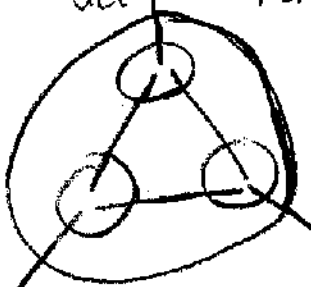
$$\det(1,6,7; 2,5,11) < 0$$



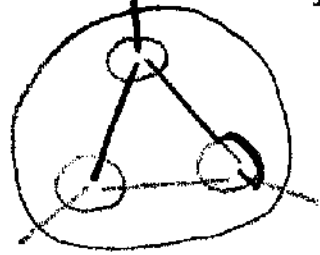
$$\det(1,6,7; 2,4,10) < 0$$



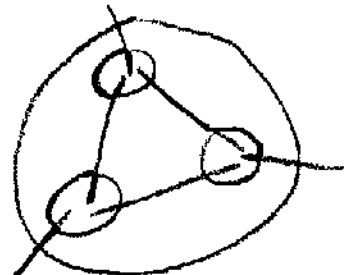
$$\det(1,6,7; 2,4,11) < 0$$



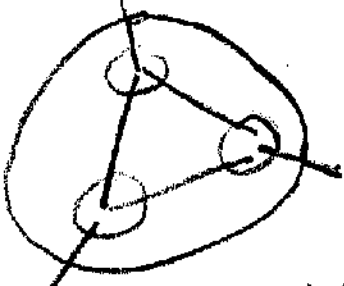
$$\det(1,2,7; 4,6,12) > 0$$



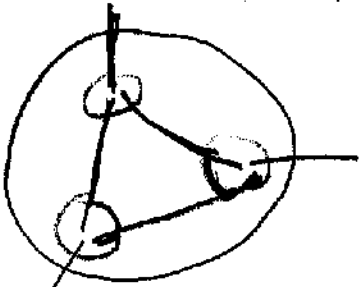
$$\det(1,6,7; 2,9,10) < 0$$



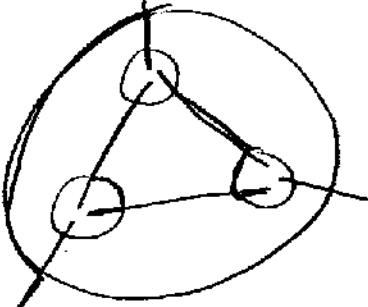
$$\det(1,2,6; 7,9,11) > 0$$



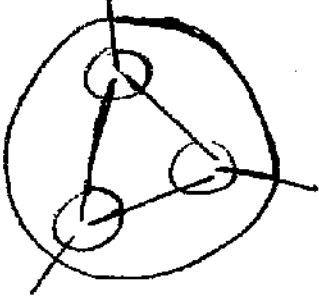
$$\det(1,6,7; 2,9,12) < 0$$



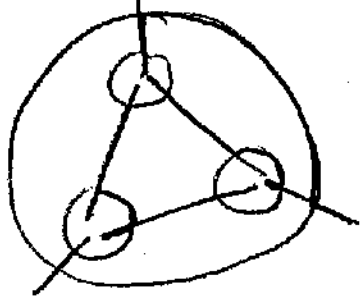
$$\det(1,6,7; 3,4,10) < 0$$



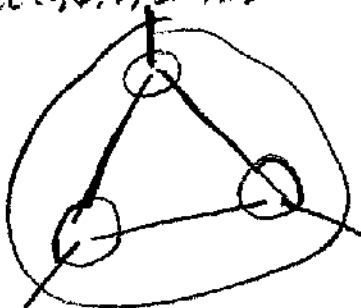
$$\det(1,6,7; 3,4,11) < 0$$



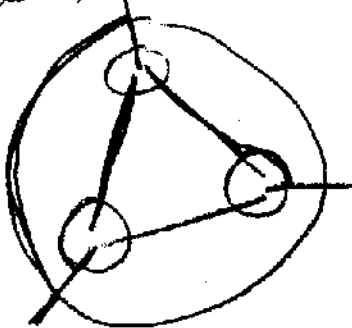
$$\det(1,7,10; 3,6,9) < 0$$



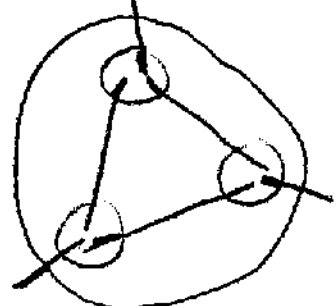
$$\det(1,6,7; 3,9,12) < 0$$



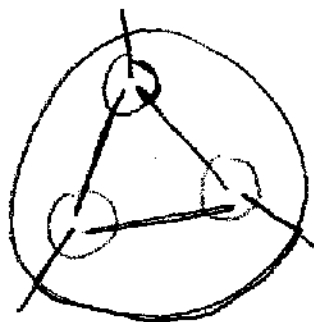
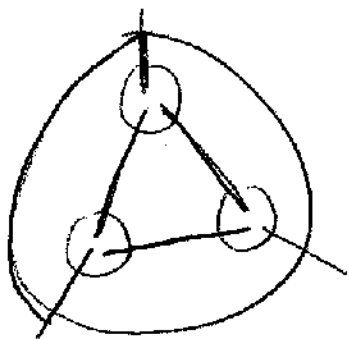
$$\det(1,6,7; 8,9,10) < 0$$



$$\det(1,6,7; 8,9,11) < 0$$



.4-4 3 in 2 circles, 2 in one circle



$$\det(1,4,6,7; 2,3,5,8) > 0$$

$$\det(1,2,3,6; 4,5,7,8) > 0$$

$$\det(1,2,3,7; 4,5,6,8) > 0$$

$$\det(1,2,4,8; 3,5,6,7) > 0$$

$$\det(1,2,5,7; 3,4,6,8) > 0$$

$$\det(1,2,6,8; 3,4,5,7) > 0$$

$$\det(1,3,4,8; 2,5,6,7) > 0$$

$$\det(1,4,5,6; 2,3,7,8) < 0$$

$$\det(1,5,6,8; 2,3,4,7) > 0$$

$$\det(1,5,7,8; 2,3,4,6) < 0$$

$$\det(1,6,7,8; 2,3,4,5) < 0$$

$$\det(1,4,6,9; 2,3,7,8) > 0$$

$$\det(1,2,3,6; 4,7,8,9) > 0$$

$$\det(1,2,3,7; 4,6,8,9) > 0$$

$$\det(1,2,4,6; 3,7,8,9) > 0$$

$$\det(1,2,4,8; 3,4,7,9) > 0$$

$$\det(1,2,6,9; 3,4,7,8) > 0$$

$$\det(1,2,7,9; 3,4,6,8) < 0$$

$$\det(1,2,8,9; 3,4,6,7) < 0$$

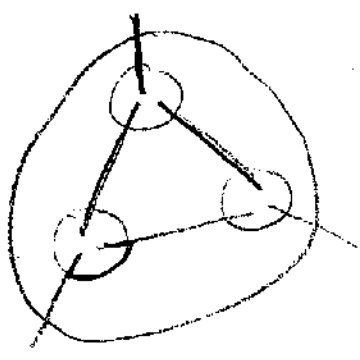
$$\det(1,3,4,6; 2,7,8,9) > 0$$

$$\det(1,4,6,7; 2,3,8,9) < 0$$

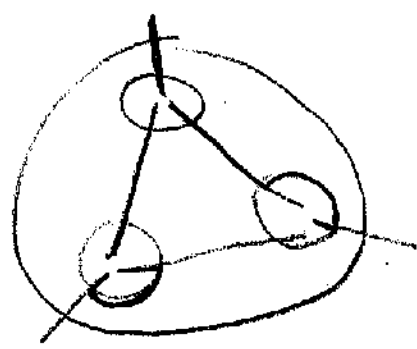
$$\det(1,6,7,8; 2,3,4,9) > 0$$

$$\det(1,7,8,9; 2,3,4,6) > 0$$

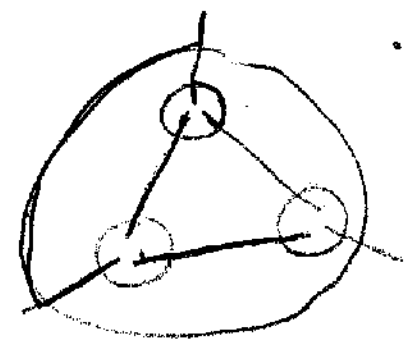
4<sup>th</sup> 3 in 2 circles, 1 in two others



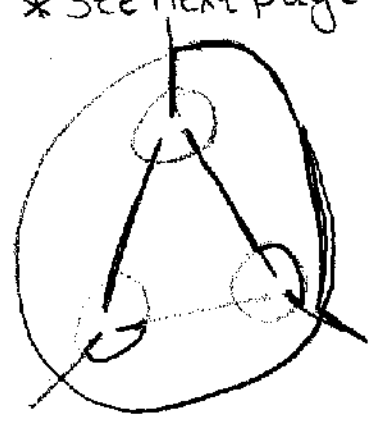
$\det(1,3,7,6; 2,8,10,5) > 0$   
 \* See next page



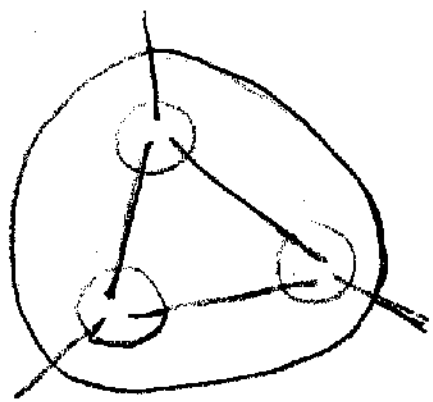
$\det(1,3,6,7; 2,8,9,10) > 0$



$\det(1,4,7,10; 2,3,6,8) > 0$

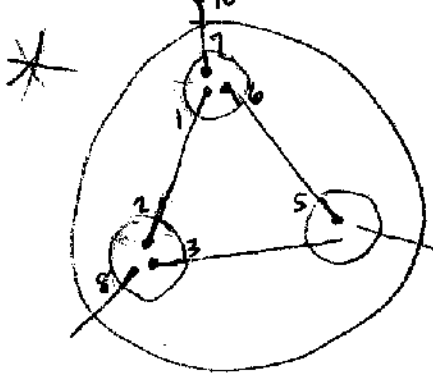


$\det(1,6,7,8; 2,3,9,12) > 0$



$\det(1,10,7,8; 2,3,5,12) > 0$





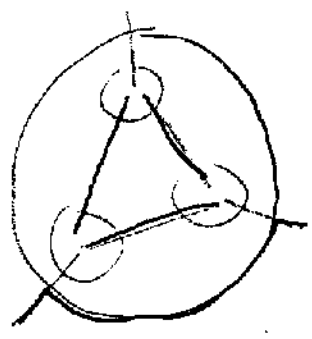
- 1-267
- 2-138
- 3-25810
- 5-36810
- 6-157
- 7-1,6,10
- 8-2,3,5,10
- 10-3,5,7,8

13

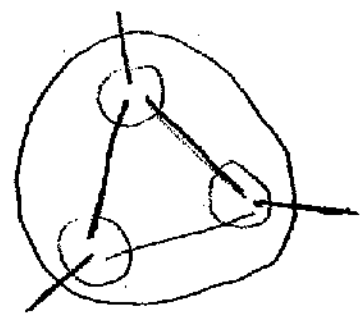
$\begin{array}{ c } \hline 1\ 2\ 3\ 5 \\ \hline 6\ 7\ 8\ 10 \\ \hline \end{array}$	$\begin{array}{ c } \hline 1\ 2\ 3\ 6 \\ \hline 5\ 7\ 8\ 10 \\ \hline \end{array}$	$\begin{array}{ c } \hline 1\ 2\ 3\ 7 \\ \hline 5\ 6\ 8\ 10 \\ \hline \end{array}$	<del><math>\begin{array}{ c } \hline 1\ 2\ 3\ 8 \\ \hline 5\ 6\ 7\ 10 \\ \hline \end{array}</math></del>	$\begin{array}{ c } \hline 1\ 2\ 3\ 10 \\ \hline 5\ 6\ 7\ 8 \\ \hline \end{array}$
<del>1,5 no conn 2,7,8,10</del>	1,2,5,7 2 pair 3,6,8,10	<del>1,2,5,8 3,6,7,10</del>	2,5,10 mult 3,6,7,8	
<del>1,4,9,10 3,5,8,10</del>	$\begin{array}{ c } \hline 1\ 2\ 6\ 8 \\ \hline 3\ 5\ 7\ 10 \\ \hline \end{array}$	1,2,6,10 2 pair 3,5,7,8		
$\begin{array}{ c } \hline 1\ 2\ 7\ 8 \\ \hline 5\ 6\ 9\ 10 \\ \hline \end{array}$	<del>1,2,7,10 3,5,6,8</del> NO conn			
$\begin{array}{ c } \hline 1\ 2\ 8\ 10 \\ \hline 3\ 5\ 6\ 7 \\ \hline \end{array}$				
$\begin{array}{ c } \hline 1\ 3\ 5\ 6 \\ \hline 2\ 7\ 8\ 10 \\ \hline \end{array}$	1,3,5,7 mult 2,6,8,10	<del>1,3,5,8 2,6,7,10</del> 2 pair	1,3,5,10 mult 2,6,7,8	
$\begin{array}{ c } \hline 1\ 3\ 6\ 7 \\ \hline 2\ 5\ 8\ 10 \\ \hline \end{array}$	1,3,6,8 mult 2,5,7,10	1,3,6,10 mult 2,5,7,8		
1,3,7,8 mult 2,5,9,10	1,3,7,10 2 pair 2,5,6,8			
<del>1,3,8,10 2 pair 2,5,6,7</del>				
<del>1,5,6,7,10 2,3,8,10</del> mult	1,5,6,8 2 pair 2,3,7,10	$\begin{array}{ c } \hline 1\ 5\ 6\ 10 \\ \hline 2\ 3\ 7\ 8 \\ \hline \end{array}$		
1,5,7,8 2,3,6,10	$\begin{array}{ c } \hline 1\ 5\ 7\ 10 \\ \hline 2\ 3\ 6\ 8 \\ \hline \end{array}$			
1,5,8,10 mult 2,3,6,7				
1,6,7,8 no conn 2,3,5,10	<del>1,6,7,10 no conn 2,3,5,8</del>			
1,6,8,10 mult 2,3,5,7				
$\begin{array}{ c } \hline 1\ 7\ 8\ 10 \\ \hline 2\ 3\ 5\ 6 \\ \hline \end{array}$				

- $\det(1,2,3,5; 6,7,8,10) < 0$
- $\det(1,2,3,6; 5,7,8,10) < 0$
- $\det(1,2,3,7; 5,6,8,10) > 0$
- $\det(1,2,3,10; 5,6,7,8) < 0$
- $\det(1,2,5,8; 3,6,9,10) > 0$
- $\det(1,2,6,8; 3,5,7,10) > 0$
- $\det(1,2,7,8; 3,5,6,10) < 0$
- $\det(1,2,8,10; 3,5,6,7) > 0$
- $\det(1,3,5,6; 2,7,8,10) > 0$
- $\det(1,3,6,7; 2,5,8,10) < 0$
- $\det(1,5,6,10; 2,3,7,8) > 0$
- $\det(1,5,7,10; 2,3,6,8) > 0$
- $\det(1,7,8,10; 2,3,5,6) > 0$

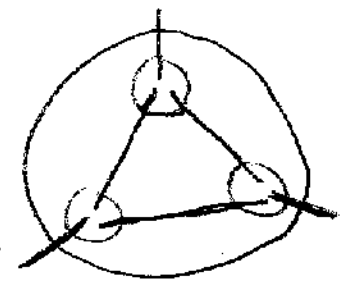
4.4 2 in four circles



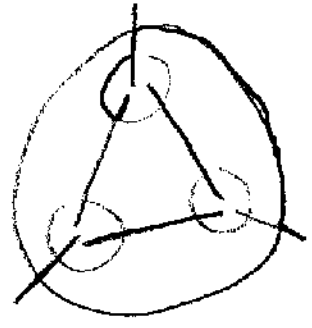
$\det(1,4,6,12; 2,3,5,11) > 0$



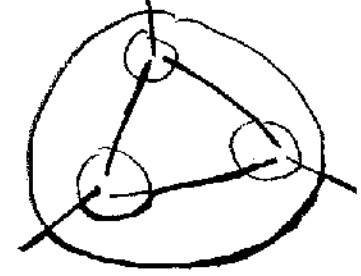
$\det(1,6,11,12; 2,5,8,9) > 0$



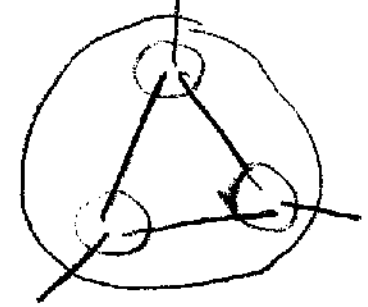
$\det(1,3,8,12; 4,6,9,11) > 0$



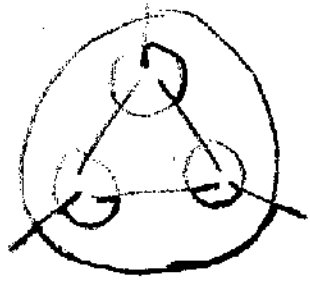
$\det(1,3,6,8; 4,5,11,12) < 0$



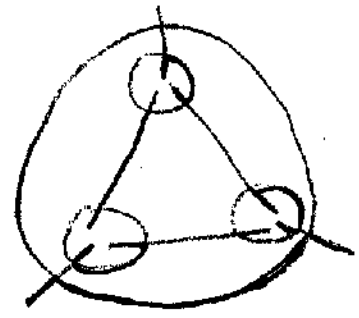
$\det(4,8,11; 2,4,5,12) < 0$



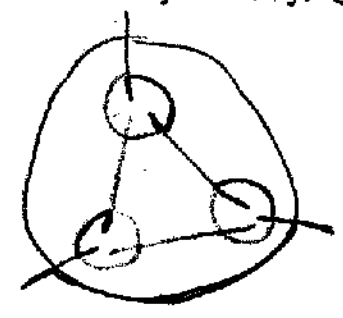
$\det(1,6,11,12; 2,4,8,9) > 0$



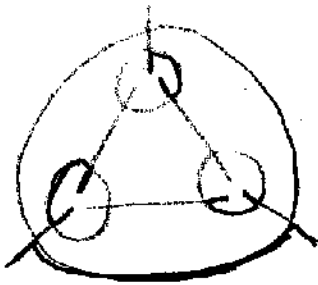
$\det(3,4,7,11; 6,8,9,12) > 0$



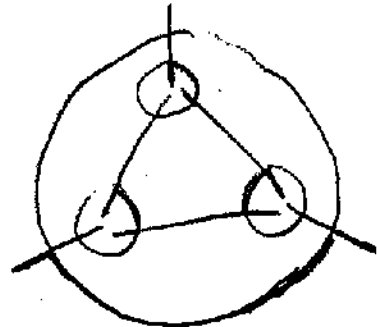
$\det(3,7,9,12; 5,10,8,11) < 0$



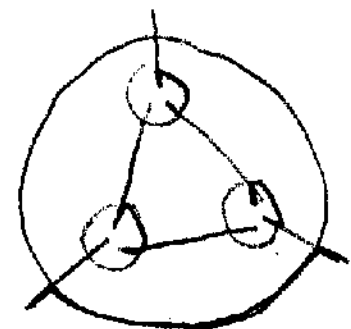
$\det(2,5,6,12; 7,8,9,11) > 0$



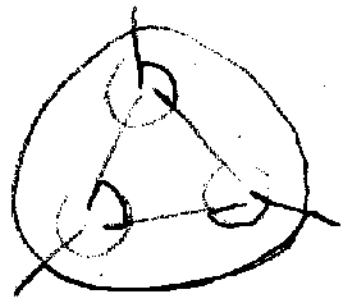
$\det(2,7,9,12; 4,6,8,11) < 0$



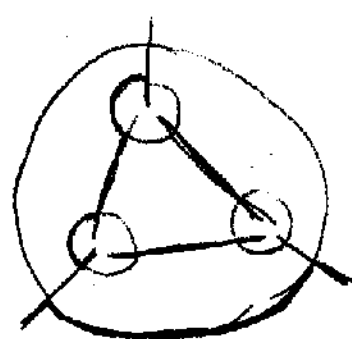
$\det(2,5,6,11; 3,4,7,12) > 0$



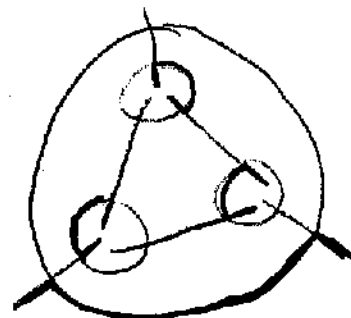
$\det(2,7,9,12; 3,5,6,11) < 0$



$\det(2,6,9,12; 3,4,7,11) < 0$

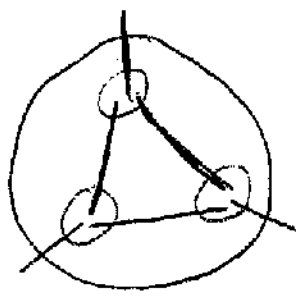


$\det(2,4,9,11; 5,6,8,12) > 0$

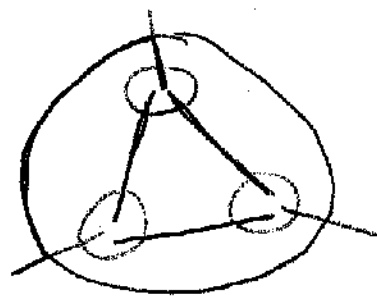


$\det(2,4,9,11; 5,6,8,12) > 0$

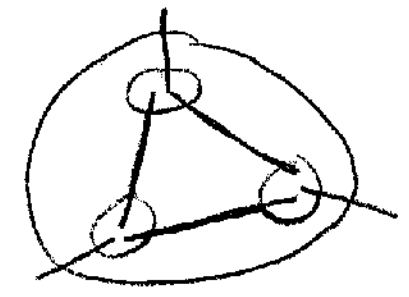
3 in one circle, 2 in two circles, 1 in one circle 15



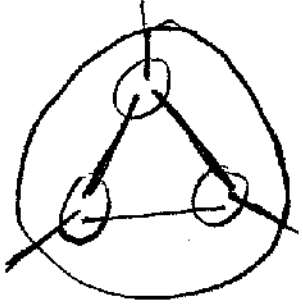
$$\det(1,4,6,7; 2,3,5,10) > 0$$



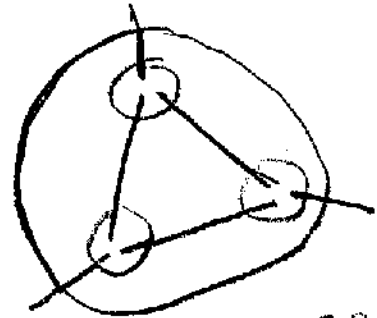
$$\det(1,4,6,7; 2,3,5,11) > 0$$



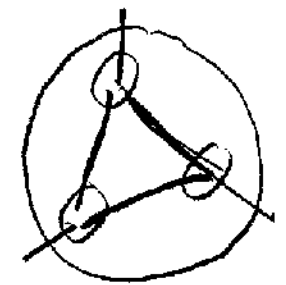
$$\det(1,3,6,7; 2,5,9,10) > 0$$



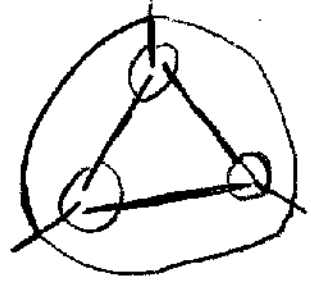
$$\det(1,6,7,12; 2,3,5,9) > 0$$



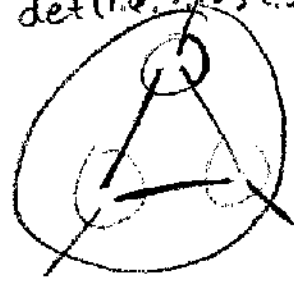
$$\det(1,6,7,12; 2,3,5,9) > 0$$



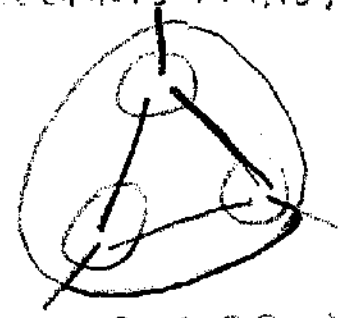
$$\det(1,4,6,7; 2,3,9,10) > 0$$



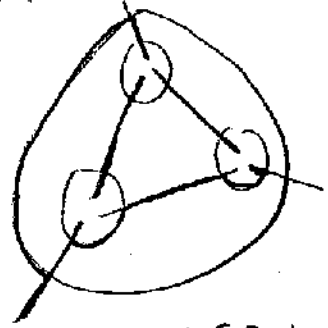
$$\det(1,4,6,7; 2,3,9,11) > 0$$



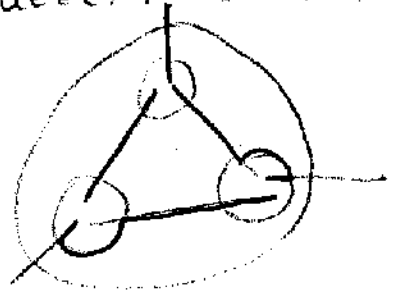
$$\det(1,4,6,9; 2,3,7,12) > 0$$



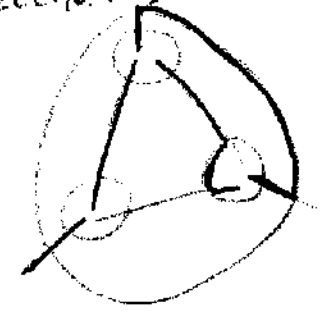
$$\det(1,6,7,9; 2,5,8,10) < 0$$



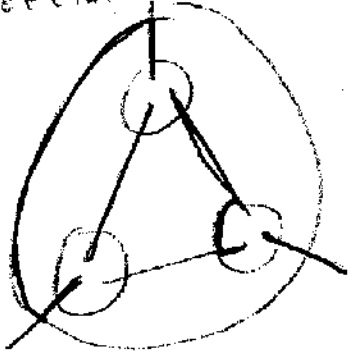
$$\det(1,6,7,8; 2,5,9,11) < 0$$



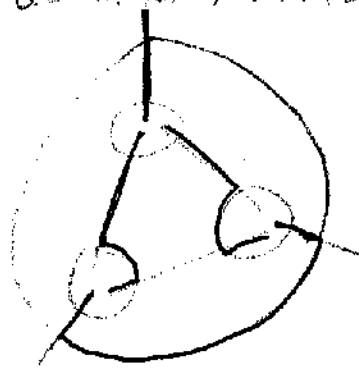
$$\det(1,6,7,9; 2,8,9,10) > 0$$



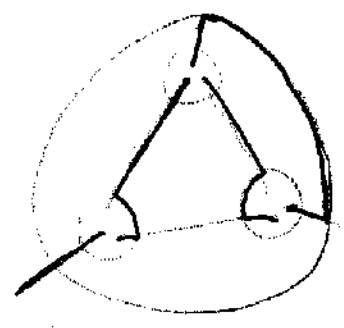
$$\det(1,6,7,11; 2,4,8,9) < 0$$



$$\det(1,4,7,11; 2,4,8,9) > 0$$



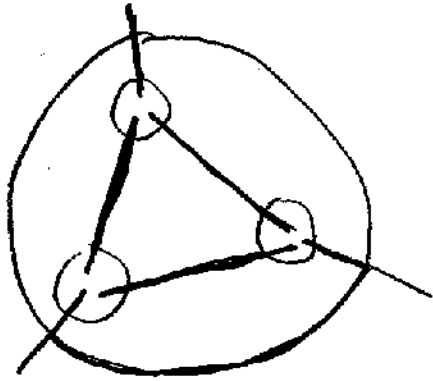
$$\det(1,6,7,9; 3,4,8,10) < 0$$



$$\det(1,6,7,11; 3,4,8,9) < 0$$

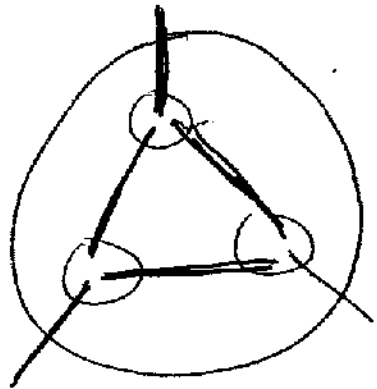
S-5 3 in 3 circles, 1 in one circle

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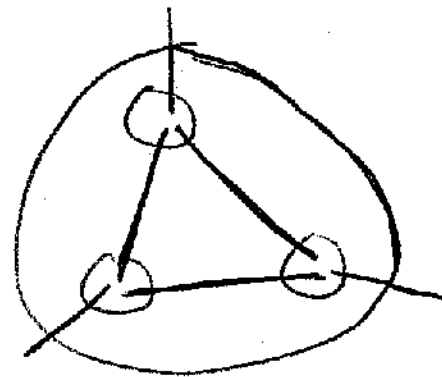


$$\det(1,3,6,7,8,2,4,5,9,10) > 0$$

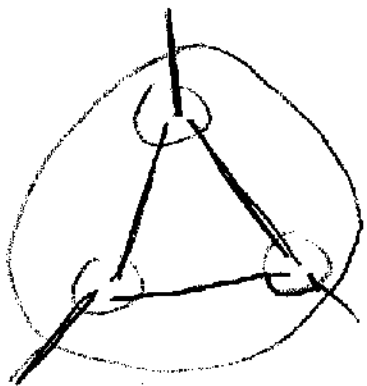
5th 5 in 2 circles, 2 in 2 circles



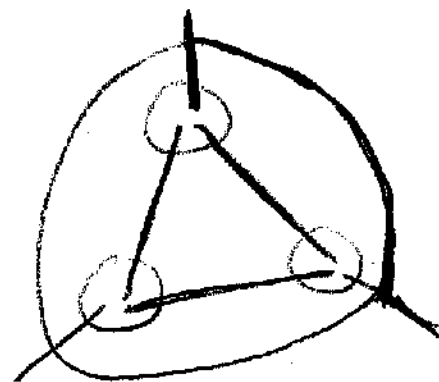
$$\det(1,4,6,7,11; 2,3,5,8,10) > 0$$



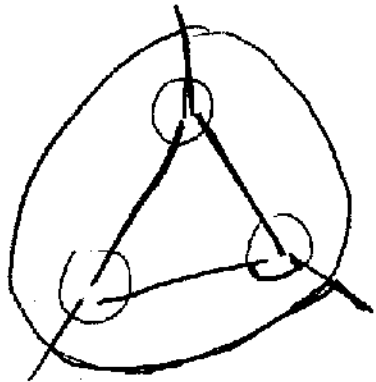
$$\det(1,4,6,7,11; 2,3,5,8,12) > 0$$



$$\det(1,6,7,9,11; 2,3,5,8,10) > 0$$



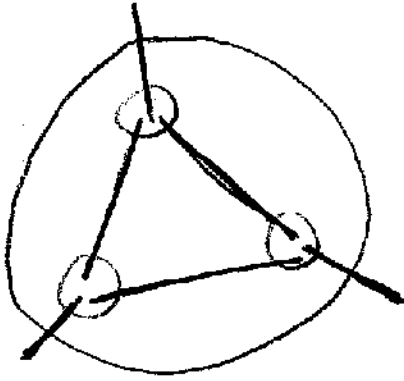
$$\det(1,6,7,9,11; 2,3,5,8,12) > 0$$



$$\det(1,6,7,9,12; 2,3,5,8,10) > 0$$

6x6 all boundary nodes

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$$\det(1,4,6,7,9,11; 2,3,5,8,10,12) > 0$$