

Your Name

Your Signature

Student ID #

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	David	Avanti
Section	1:30 12:30	1:30 12:30
(circle one)	EA EB	EC ED

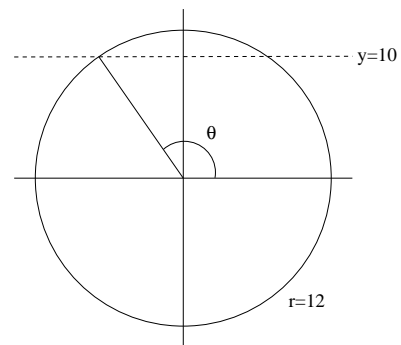
Problem	Total Points	Score
1	12	
2	13	
3	12	
4	13	
Total	50	

- This exam is closed book. You may use one $8\frac{1}{2} \times 11$ sheet of notes.
- Do not share notes.
- In order to receive credit, you must show your work. Do not do computations in your head or only on your calculator. Instead, write them out on the exam paper.
- Place a box around **YOUR FINAL ANSWER** to each question.
- If you use a trial and error (or guess and check) method when an algebraic method is available, you will not receive full credit.
- If you need more room, use the backs of the pages and indicate to the reader that you have done so.
- Raise your hand if you have a question.

1 (12 points) Solve the following.

(a) (6 points) Let $f(x) = \frac{3x+2}{5-x}$. Compute $f^{-1}(x)$.

(b) (6 points) Find the angle θ shown in the picture.



2 (13 points) At a small elementary school in Laie, Hawaii there were 120 students in 1992. The school had 8 teachers that year. In 1996, the school had 140 students and 11 teachers. Take $t = 0$ in 1992.

- (a) (3 points) Give a linear function relating the number of teachers T to the year t .
- (b) (3 points) Give a linear function relating number of students S to the year t .
- (c) (3 points) Give a rational function $R(t)$ that computes the ratio of students to teachers.
- (d) (4 points) In the long run, what will be the ratio of students to teachers?

3 (12 points) Isobel buys some shares of stock in the Timken Company for \$50.78 a share. The stock goes up and 2 months after she made her purchase, it is selling for \$53 a share. The stock then starts going down and finally bottoms out at \$25 a share 13 months after she bought it. The stock then starts going up again.

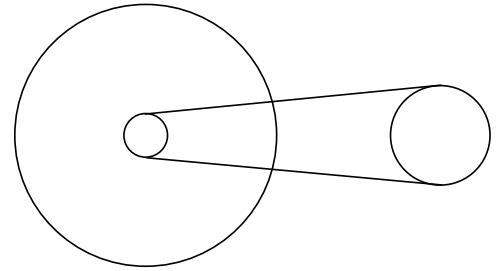
(a) (7 points) Give a sinusoidal function $P(t)$ that gives the price of a share of Timken stock t months after Isobel bought her shares.

(b) (2 points) What is the price per share 10 months after she bought her shares?

(c) (3 points) What is the first time, after $t = 13$, that the stock price will be at a maximum?

4 (13 points) Isobel is back on her bicycle. The bike has 30 inch diameter wheels. The rear sprocket has a 2 inch radius.

- (a) (7 points) If Isobel pedals the front sprocket at a rate of 121 RPM then the bike travels at a rate of 27 mph. What is the radius of the front sprocket?



- (b) (6 points) If she pedals at a rate of 112 RPM how fast will the bike go, in miles per hour?