MATH 120C

EXAM TWO

AUTUMN, 2001

Your Name

Your Signature

Student ID #

Quiz Section (circle one)

	Jeremy	Edwin
11:30	CA	CC
12:30	CB	CD

Results will be posted on the Math 120C web page as soon as they are graded (by Sunday, November 18th at the latest). Please check one of the following boxes and sign above.

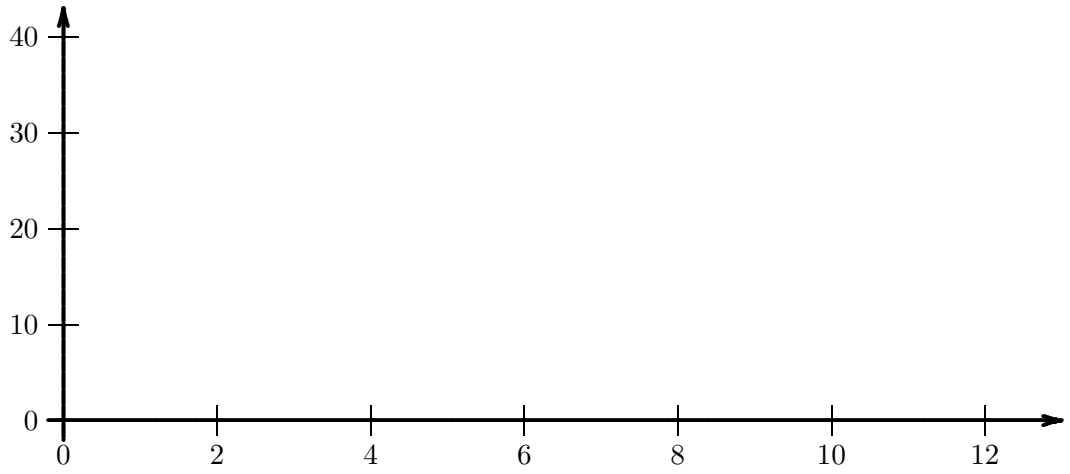
- ☐ Please post my score using the last five digits of my Student Number.
- ☐ Please post my score using the the following five digits: | | | | | |
- ☐ Please do not post my score. I realize that this means I will have to wait until Tuesday to learn my score.

Problem	Total Points	Score
1	20	
2	15	
3	15	
Total	50	

- You are not allowed to use any notes for this exam.
- You may use a scientific calculator, but not a graphing calculator. You are not allowed to share calculators.
- In order to receive partial credit, you must show your work. Be wary of doing computations in your head. Instead, write out your computations on the exam paper.
- Your answers should either be *exact answers* (like $2\sqrt{2}$) or rounded to three digits after the decimal (like 2.828) in whatever units you're using. Be careful not to round intermediate calculations whenver possible.
- **Place YOUR FINAL ANSWER to each question in the box provided.**
- If you need more room, use the backs of the pages and indicate to the grader that you have done so.
- Raise your hand if you have a question.
- Good luck!

1 (20 points) The squid from Exam One is now chasing Don and Ellen, the scuba divers. This particular squid can't see very well, so it's travelling in a sinusoidal path, trying to find the divers. As Don and Ellen watch, they see that the squid dives and rises twice (two complete cycles) in 6 minutes. According to Don's observations, the squid was at it's greatest depth (35 feet) 1 minute and 45 seconds after they started watching it. The least deep the squid ever gets is to 5 feet.

(a) (5 points) Graph the depth $d(t)$ (measured in feet) of the squid as a function of the number t of minutes since Don and Ellen started watching. Graph at least 3 periods or at least 10 minutes, whichever you prefer.



(b) (5 points) The equation for the function $d(t)$ is, in standard form,

$$d(t) = A\sin\left(\frac{2\pi}{B}(t-C)\right) + D.$$

Find the values of A, B, C, and D.

$A =$ ____

$B =$ ____

$C =$ ____

$D =$ ____

(c) (5 points) How deep is the squid 5 minutes after Don and Ellen start observing it?

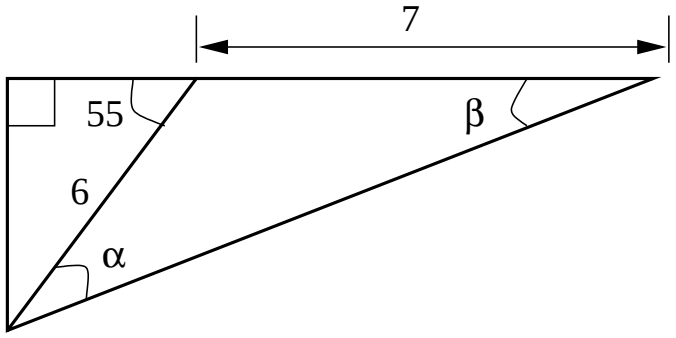
At $t =$ [ ]

(d) (5 points) Suppose that Don and Ellen are floating at a depth of 8 feet. Find the first time after $t = 1$ that the squid is at this depth.

At $t =$ [ ] .

2 (15 points)

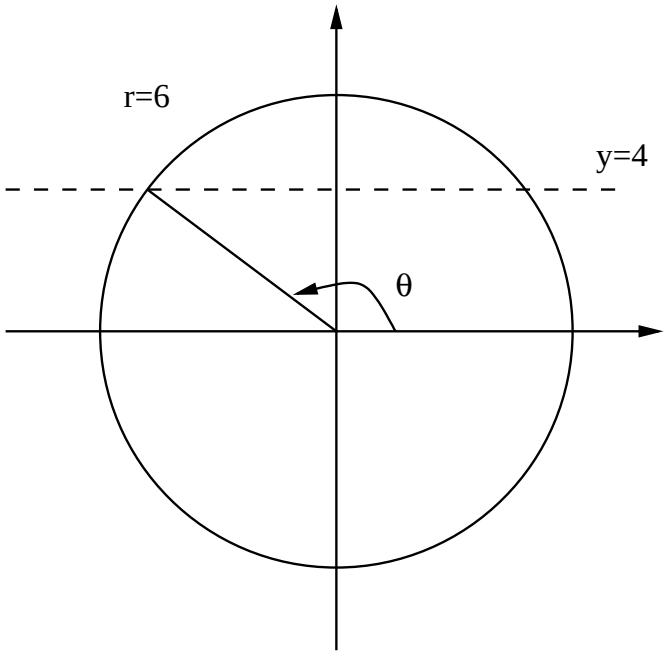
(a) (5 points) Find α and β (in degrees) in the triangle below.



$\alpha =$ ____ degrees.

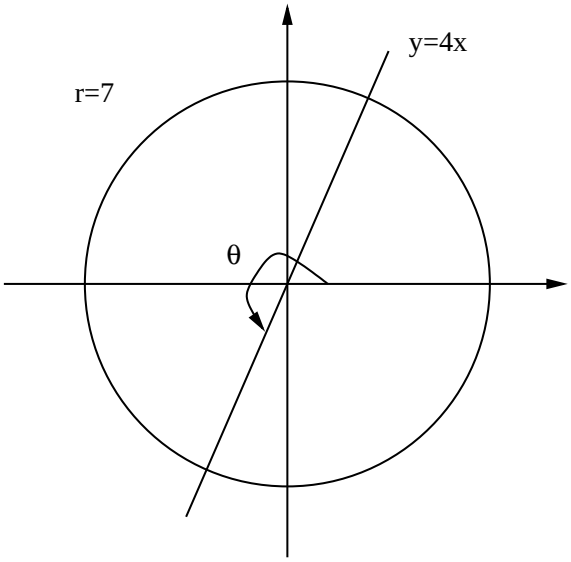
$\beta =$ ____ degrees.

(b) (5 points) Find the angle θ, in radians, given in the circle below.



$\theta =$ ____ radians.

(c) (5 points) Find the angle θ, in radians, given in the circle below.



$\theta =$ ____ radians.

3 (15 points)

(a) (5 points) Suppose we are given two functions:

$$f(x) = \frac{3x-1}{x-3} \qquad \text{and} \qquad g(x) = x^2 + 1.$$

Find inverses $f^{-1}(x)$ and $g^{-1}(x)$ for the functions $f(x)$ and $g(x)$. (There may be more than one possible inverse – this question asks you to find *one* inverse, not all of them.) Specify the domains on which these functions are defined.

$f^{-1}(x) =$ ____

domain of $f^{-1}(x)$: ____

$g^{-1}(x) =$ ____

domain of $g^{-1}(x)$: ____

(b) (5 points) Recall that $f(x) = \dfrac{3x-1}{x-3}$. Find the vertical and horizontal asymptotes of the graph of $f(x)$, if there are any. (If there are none, write NONE in the box provided.)

vertical asymptote: ☐

horizontal asymptote: ☐

(c) (5 points) Suppose two wheels are connected with a chain (like a bicycle wheel to the sprocket). The larger wheel, with a radius of 8 inches, spins at a rate of 100 RPM. The smaller wheel has a radius of 3 inches. How fast, in RPM, does it spin?

It spins at ☐ RPM.