Math 120U
Exam 2

Name:____

Problem 1		8
Problem 2		12
Problem 3		10
Problem 4		8
Problem 5		12
Total		50

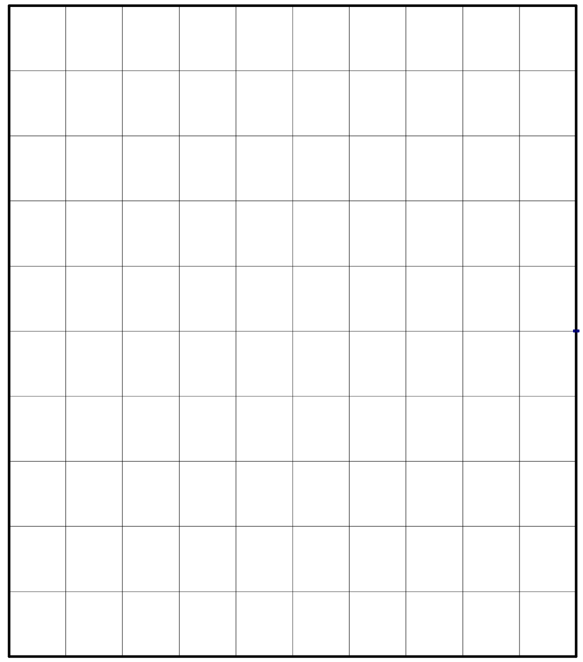
Read this:

- Do not cheat.
- To receive partial credit, make sure you show all your work in a neat and orderly fashion.
- You're allowed to use one handwritten 8½ x 11 sheet of notes.
- The number of points each item is worth is marked. Take that into account if you're running out of time.
- If you need scratch paper, use the back of the previous page and indicate where to look.
- Place a box around your answer to each question.
- Raise your hand if you have a question.

1. [8 pts] If $\sin\left(\frac{3\pi}{7}\right) = .97493$, find all θ such that $-4\pi \le \theta \le 0$ and $\sin(\theta) = .97493$. (If you do your work neatly and state clearly what you're doing, you're more likely to receive partial credit if you make a mistake.)

2. Let $f(x) = \dfrac{3x-3}{2x+4}$.

(a) [7 pts] Graph $y = f(x)$. Be sure to include all zeroes and asymptotes. (Be careful not to spend too much time on this problem. Graphing can take a long time.)

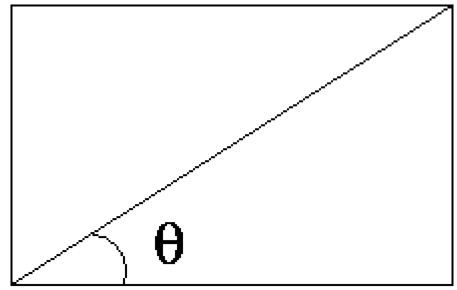


(b) [5 pts] Find $f^{-1}(y)$.

3. [7 pts] (a) The population density of rabbits in a region can be described sinusoidally. Assume that in March of 2000, the population density of rabbits reached its minimum. At that time the density of rabbits in a certain area was 40 rabbits per acre. In November of 2000, the population density reached its max of 100 rabbits per acre. Find a sinusoidal model P(t) for the population density of rabbits in the area t months after the turn of the century. i.e. t=1 is January 2000, t=2 is February 2000, etc.

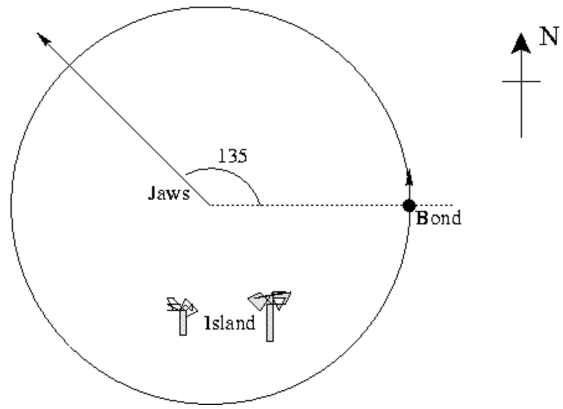
(b) [3 pts] How many rabbits are there in January of 2001?

4. [8 pts] A rectangle has perimeter 10.
Find a formula $A(\theta)$ for the area of the rectangle in terms of the angle θ, that the diagonal makes with a side.



5. James Bond is on a jet ski chasing after Jaws, who is on a hovercraft. Jaws starts at the center of a circular island of radius 2 miles, and travels northwest (i.e. at an angle of 135°) at a speed of 1/3 mile/min. James Bond starts directly east of Jaws two miles away.

(a) [3 pts] Putting coordinates at the center of the island, find Jaws's coordinates (x, y) after t minutes.



(b) [6 pts] If James Bond travels counterclockwise along the edge of the island, what speed should he travel to intercept Jaws exactly as Jaws reaches the shore? Give both the linear speed (in miles/min) and the angular speed (in your favorite units).

(d) [3 pts] Give James Bond's coordinates (x, y) after t minutes. (Don't worry about restriction of the domain or piecewise functions.)