Math 120 - Summer 2006
Final Exam Part Two
August 18th, 2006

Name: _____   Section: _____

1	10	
2	10	
3	10	
4	10	
5	10	
Total	50	

- You may use a scientific calculator during this examination. Other electronic devices are not allowed, and should be turned off for the duration of the exam.

- If you use a trial-and-error or guess-and-check method, or read a numerical solution from your calculator when an algebraic method is available, you will not receive full credit.

- You may use one hand-written 8.5 by 11 inch page of notes.

- Show all work for full credit.

- You have 60 minutes to complete the exam.

1. (a) Solve for x:

$$3^x = 5^{2x^2 - 7}$$

(b) Let $f(x) = \ln(2x) - \ln(x + 1)$. Find the inverse function $f^{-1}(x)$.

2. The water temperature in an aquarium is set to vary sinusoidally as a function of time. The temperature varies between a maximum of 80 degrees and a minimum of 50 degrees. On January 1st at 6 am the temperature is 65 degrees and decreases to 50 degrees 2.5 hours later. At what times on January 2nd is the temperature 72.5 degrees?

3. The populations of Greenville and Horseton are growing exponentially.

   In 1990 the population of Greenville was 20000; in 2000, the population was 25000. Horseton's population was 8000 in 1990, and doubles every 12 years.

   (a) How long does it take the population of Greenville to double?

   (b) What year will the populations of Greenville and Horseton be the same?

4. Let $u(t)$ be the usual step function: $\quad u(t) = \begin{cases} 0 & \text{if } t < 0 \\ 1 & \text{if } 0 \le t \le 1 \\ 0 & \text{if } t > 1 \end{cases}$

Find a multipart rule for $f(t) = u(\frac{t}{2}) + u(\frac{t-1}{2})$.

5. Graph the function $g(x) = -f(2x + 2) + 3$, where the graph of $f(x)$ is shown below. Be sure to clearly label the points of your graph.