Math 130 Exam 1 Sample 2

Directions: Do not simplify unless indicated. Non-graphing calculators are permitted. Show all work as appropriate for the methods taught in this course. Partial credit will be given for any work or words which are relevant to the problem. Units should be included for all real-world problems.

Please put problem 1 on answer sheet 1

1. (a) Solve $16^{3-x} = 32^x$.
   (b) Suppose $\log 2 = a$ and $\log 3 = b$. Write $\log \sqrt{600}$ in terms of a and b.
   (c) Find the average rate of change of $f(t) = t^2 + 2^t$ between $t = 3$ and $t = 5$. Simplify.

Please put problem 2 on answer sheet 2

2. Suppose a population of monkeys doubles every twelve years.
   (a) Find the value of k in the growth formula $A = A_0 e^{kt}$.
   (b) Suppose there are initially 300 monkeys. How many will there be after 5 years? Give an exact value and an approximation to the nearest monkey.
   (c) How long will it take until there are 1000 monkeys? Give an exact value and an approximation to two decimal places.

Please put problem 3 on answer sheet 3

3. A certain's person blood pressure is given by the function $p(t) = 115 + 25\sin(160\pi t - 10)$ where $p(t)$ is measured in mmHg (a pressure measurement) and t is in minutes.
   (a) Sketch the graph of one period of this function.
   (b) At what time does the minimum blood pressure occur?
   (c) What is this pressure?

Please put problem 4 on answer sheet 4

4. (a) Use the x-values $x = -0.1$, -0.01, 0.1 and 0.01 to get an educated guess for $\lim_{x\to 0} \frac{e^{2x}-1}{x}$.
   (b) Calculate $\lim_{x\to 0} \frac{x^2+x}{x^2-x}$
   (c) Calculate $\lim_{x\to \infty} \sqrt{\frac{x^2+x}{4x^2-x+1}}$

Please put problem 5 on answer sheet 5

5. (a) Suppose that $y = 1.4x + 4$ meets and is tangent to $f(x)$ at $x = 3$. What is $f'(3)$? Explain. Draw a picture if it helps.
   (b) Use the limit definition of the derivative with $f(x) = 5x - x^2$ to find $f'(2)$.
   (c) Use the limit definition of the derivative to find the equation of the tangent line to $g(x) = \sqrt{2x+1}$ at $x = 3$.

The End