MATH 141 Test 1 100 Points Sep 9, 2005

Name: _____

1. Find the domain of each function.
   (a) (5 points) $f(t) = \sqrt{1 - e^t}$

   (b) (5 points) $u(v) = \frac{1}{1-e^v}$

2. Express the given quantity as a single logarithm.
   (a) (5 points) $3 \ln 5 - \ln 4$

   (b) (5 points) $\ln \sin(x) - \ln \cos(x)$

3. (6 points) Find a formula for the inverse of the function.

$$h(w) = \frac{1+w}{2+3w}$$

4. (9 points) Eliminate the parameter to find a Cartesian equation of the curve.

$$x(\theta) = \sqrt{\theta}$$
$$y(\theta) = 1 - \theta + \theta^2$$

5. The displacement (in meters) of an object moving in a straight line is given by $s(t) = 10t - t^2$, where t is measured in seconds. Find the average rate of change for $s(t)$ given the following intervals. Note: Solve as well as you can.

   (a) (5 points) [3,4]

   (b) (5 points) [3,5]

6. Evaluate the limit, if it exists.

   (a) (10 points) $\lim_{x \to 3} \frac{x^2 - 5x + 6}{x - 3}$

   (b) (10 points) $\lim_{s \to -1} \frac{\sqrt{s+1} + 1}{s - 1}$

7. (10 points) For what value of the constant c is the function f continuous on $(-\infty, \infty)$?

$$f(x) = \begin{cases} cx^2 - 2x & \text{if } x < 3, \\ x^3 - cx & \text{if } x \geq 3 \end{cases}$$

8. (10 points) Use the Intermediate Value Theorem to show that there is a root of f in the given interval.

$$f(x) = x^4 + x - 3, \qquad (1, 3)$$

9. (7 points) Draw a graph of a function f so that
   (a) $\lim_{x\to-\infty} f(x) = 0$
   (b) $\lim_{x\to0^+} f(x) = \infty$
   (c) $\lim_{x\to0^-} f(x) = -\infty$
   (d) $\lim_{x\to-\infty} f(x) = 6$

10. (8 points) Find

$$\lim_{t\to-\infty} \frac{t^2+2}{t^3+t^2-1}.$$