Mathematics 121-A   Exam 1   Spring 2006

February 2, 2006

Technology used:_____ $\overline{}$
                                                                    Name

Directions:

- **Only write on one side of each page.**

- **Use terminology correctly.**

- **Show your work: No Work – No Credit**

- **Partial credit is awarded for correct approaches so justify your steps.**

Do any seven (7) of the following.

1. [10 points] A bicyclist's position is given by the function $s(t) = 3t - 2t^2$ where t is measured in seconds and $s(t)$ is measured in meters. The function $Q(h)$, below, gives the average velocity of the bicylist from time $t = 0.5$ to time $t = 0.5 + h$.

$$Q(h) = \frac{s(0.5 + h) - s(0.5)}{h}.$$

   Use your calculator to fill in the following table and then "guess" what the function Q should output for the input $h = 0$ (even though that input is **not** in the domain of Q).

h	0.1	0.001	0.00001
$Q(h)$			

2. [10 points] Compute $\cot(\arcsin(x))$.

3. [10 points] Given $F(x) = \sqrt[3]{\tan(x^2 + 1)}$. Write down three functions f, g, h with the property that $(f \circ g \circ h)(x) = F(x)$.

4. [10 points] An open box with a square base is to be built for \$48.00. The sides of the box will cost \$3.00 per square foot and the base will cost \$4.00 per square foot. Express the volume of the box as a function of the length of one side of its (square) base.

5. [10 points] Write the equation of the circle whose graph is the result of moving the graph of $x^2 + y^2 - 4x + 8y - 5 = 0$ **two** units to the right and **three** units down.

6. [10 points] Write the equation of the circle that has $(-3, 2)$ and $(5, -8)$ as the ends of a diameter.

7. [10 points] Find values for the constants c and δ so that the numbers x in the interval $-7 < x < -1$ are the same as the numbers x that satisfy the inequality $|x - c| < \delta$.

8. [5 points each] Do both of the following.

   (a) Give an example of an even function that is not $f(x) = x^2$ or $g(x) = \cos(x)$ and use the symbolic definition (not a graph) to show it is even.

   (b) Give an example of a function that is neither even nor odd and use the symbolic definition (not a graph) to show it fails to be odd.