Math 180 - 8 AM   **Hour Exam 1**   **2/20/2004**

Name:_____   SSN:_____-_____-_____

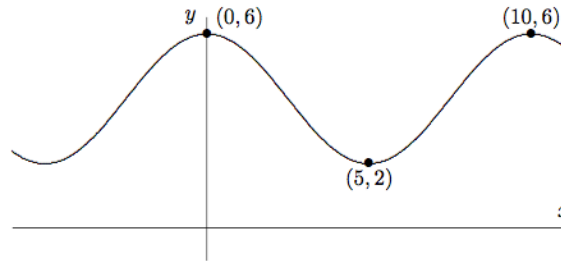**Section (circle one) :   8 AM (Xu)   9 AM (Brydges)   10 AM (Brydges)**

Show **all** of your work. **No work means no credit!**
All work and solutions should be put on the paper provided.

Problem 1: (10 pts) Give a formula for a function which has the following graph.

Problem 2: (20 pts) A differentiable function $f(x)$ has the following values given by the table

x	-2	0	2	4	6	8
$f(x)$	2	10	16	20	22	21

a) Using the data from this table, make a table of the approximate values of the derivative function $f'(x)$ for the same values of x.

b) Is $f(x)$ increasing or decreasing on the interval $-2 \leq x \leq 8$? Explain your answer.

c) Using the data from your answer to part a), make a table of the approximate values of the second derivative function $f''(x)$ for the same values of x.

d) Is $f(x)$ linear, concave up, or concave down on the interval $-2 \leq x \leq 8$? Explain your answer.

Problem 3: (20 pts) Let $f(x) = x^3 + x$. Calculate $f'(2)$ <u>using the limit definition of the derivative.</u>

Problem 4: (20 pts) Given the function

$$f(x) = \begin{cases} x^2 + x + 1 & \text{if } x \geq 1 \\ 3 - x & \text{if } x < 1 \end{cases}$$

(a) State the domain of the function.

(b) Determine $\lim_{x \to 1^-} f(x)$.

(c) Determine $\lim_{x \to 1^+} f(x)$.

(d) Is $f(x)$ continuous on its domain? Explain your answer.

Problem 5: (20 pts) Let $f(x) = \dfrac{3x^2 - 3}{x^2 - 4}$.

a) What are the zeros of $f(x)$?

b) Find all asymptotes for $f(x)$.

c) Made a careful graph of $y = f(x)$. Be sure to label the axes, label the zeros and indicate all asymptotes.

Problem 6: (10 pts) Suppose that $f(2) = -5$ and $f'(2) = 3$. Write the formula for the tangent line to f at $x = 2$.

Return this copy of the exam with your solutions.