Math 1120   **Calculus**   **Test 1.**

February 14, 2003   **Name** _____

The first 7 problems count 7 points each and the final 4 count as marked. The total number of points available is 129.

Multiple choice section. Circle the correct choice. You do not need to show your work on these problems.

1. Which of the following numbers belong to the (implied) domain of

$$f(x) = \frac{\sqrt{x-2}}{x-3}?$$

   Circle all those that apply.

   (A) -2 **(B)** 2 **(C)** 3 **(D)** 4 **(E)** 5

2. What is the y-intercept of the line defined by $\frac{x}{6} + \frac{y}{3} = 2$?

   (A) -2 **(B)** 4 **(C)** 6 **(D)** 12 **(E)** 16

3. Let $f(x) = 2x + 4$ and $g(x) = 3x - 9$. What is the value of $g(f(g(3)))$?

   (A) -18 **(B)** -3 **(C)** 3 **(D)** 9 **(E)** 18

4. Let $f(x) = x^2 + 1$. Evaluate and simplify $\frac{f(x+h)-f(x)}{h}$.

   (A) $h - 2$ **(B)** $2x - 2h + h^2$ **(C)** $2x + h$

   (D) $2x + h + 2$ **(E)** $x^2 + 2h + 2$

5. Referring to the function $h(x)$ defined in problem 9, what is the slope of the secant line joining the points $(-2, h(-2))$ and $(4, h(4))$?

   (A) -1 **(B)** $-1/2$ **(C)** 0 **(D)** $1/2$ **(E)** 1

Suppose the functions f and g are given completely by the table of values shown.

x	$f(x)$	x	$g(x)$
0	2	0	5
1	7	1	7
2	5	2	4
3	1	3	2
4	3	4	6
5	6	5	3
6	0	6	1
7	4	7	0

6. Solve the equation $f \circ g(x) = 6$?

   (**A**) 0   (**B**) 1   (**C**) 4   (**D**) 5   (**E**) 6

7. Compute $(g \circ f)(2 + f(2))$?

   (**A**) 3   (**B**) 4   (**C**) 5   (**D**) 6   (**E**) 7

On all the following questions, **show your work.**

8. (10 points) The supply and demand curves are given below for digital cameras at XYZ Distributors, where x represents the number of units and p the price. Find the equilibrium quantity and price. Demand: $p = -x^2 - 2x + 100$ and Supply: $p = 8x + 25$.

9. (30 points) For each of the next questions, let h be defined as follows:

$$h(x) = \begin{cases} x^2 - 1 & \text{if } x < 0 \\ x & \text{if } 0 \leq x < 2 \\ 3 & \text{if } x = 2 \\ 4 - x & \text{if } 2 < x \end{cases}$$

(a) What is $\lim_{x \to -1} h(x)$?

(b) What is $\lim_{x \to 0^-} h(x)$?

(c) What is $\lim_{x \to 1} h(x)$?

(d) What is $\lim_{x \to 2^+} h(x)$?

(e) What is $\lim_{x \to 2} h(x)$?

(f) What is $\lim_{x \to 4} h(x)$?

10. (40 points) Compute each of the following limits.

   (a) Let $f(x) = \begin{cases} x + 2 & \text{if } x \neq 1 \\ 1 & \text{if } x = 1 \end{cases}$

   $\lim\limits_{x \to 1} f(x)$

   (b) $\lim\limits_{x \to 2} \dfrac{x^2 - 4}{x - 2}$

   (c) $\lim\limits_{x \to 1} \dfrac{x - 1}{x^3 - 1}$

   (d) $\lim\limits_{x \to 9} \dfrac{\sqrt{x} - 3}{x - 9}$

   (e) $\lim\limits_{x \to 1} \dfrac{\frac{1}{2x} - \frac{1}{2}}{x - 1}$

   (f) $\lim\limits_{x \to 2} \dfrac{x^2 - 2x}{x^2 + x - 6}$

   (g) $\lim\limits_{x \to 2} 2x^3 \sqrt{x^2 + 12}$

   (h) $\lim\limits_{x \to \infty} \dfrac{2x^2}{1 + x^2}$