Name:_____ **EXAM 1: Ch 2.1 - 3.5**

Draw a box around your final answers. Partial credit will be given.

1. a. Find the domain of $f(x)=\dfrac{1}{x^2-3x-4}$.

   b. What is $f(-2)$?

   c. What is $f(-1)$?

   d. What is $f(0)$?

   e. What is $f(4)$?

2. Evaluate $k(-3)$ where $k=f\circ g$ and $f(x)=\dfrac{1}{2x+4}$, $g(x)=x^2-4x-5$

3. A manufacturer has a production cost of $9 for each unit produced and a fixed cost of $27,000. The product sells for $13.50 per unit.

   a. When does the manufacturer break even?

   b. How many units must be sold in order to make a profit of $9,000?

4. Find the limit. **(Be careful!)**

$$\lim_{x\to\infty}\frac{(2x^2-1)(3x+1)(x-4)(x+2)}{(x-7)(4-3x)(2x^2+3)(x^2-5)}$$

5. Find the limit.

$$\lim_{x\to 0}\frac{3-\sqrt{x+9}}{x}$$

6. Find the derivative and express your answer with positive exponents:

$$f(x)=\frac{8}{x^6}-\frac{7}{x^5}+\frac{6}{x^4}-\frac{5}{x^3}+\frac{4}{x^2}-\frac{3}{x}+2x-1$$

7. Use the limit definition to find $f'(x)$ if $f(x)=3x-2x^2$

8. Find the derivative of: $f(x)=(x^2+2)(x^3+2x+1)$ **(3 lines)**

9. Find the derivative of: $f(x)=\dfrac{x^2+2}{x^2+x+1}$ **(2 lines)**

10. Find the derivative of: $f(x)=\sqrt[3]{x^3+4}$ **(2 lines)**

Bonus Question: (if you are in the mood for more torture!)

Find $f^{(4)}(x)$ for: **[3 pts]**

$$f(x) = 9x^9 + 8x^8 + 7x^7 + 6x^6 + 5x^5 + 4x^4 + 3x^3 + 2x^2 + x$$