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171 EXAM I – October 8, 2002

NAME: _____

T.A.: _____

INSTRUCTIONS: Show all your work. Answers alone will receive little or no credit. Be neat. We do not want to be required to guess at what you're doing. We must be able to see how you got to your answer. **Take your time and be careful with your calculations. A mistake early in your work could be costly.**

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

TOTAL _____

1. (20 p'ts.) Let $f(x) = x^2 + 2x$ and $g(x) = \frac{2}{x-3}$. Find $(f \circ g)(x)$ and $(g \circ f)(x)$ and specify their domains.

Ans. $(f \circ g)(x) = \underline{\hspace{10em}}$, $\text{Dom}(f \circ g)(x) = \underline{\hspace{10em}}$

$(g \circ f)(x) = \underline{\hspace{10em}}$, $\text{Dom}(g \circ f)(x) = \underline{\hspace{10em}}$

2. (15 p'ts.) Give an $\epsilon - \delta$ proof of

$$\lim_{x \rightarrow 5} \left[\frac{2x^2 - 22x + 60}{x - 5} \right] = -2$$

3. (10 p'ts.) Find the limit or show that the limit does not exist.

$$\lim_{x \rightarrow \pi} \frac{2x^2 - 6x\pi + 4\pi^2}{x^2 - \pi^2}$$

Ans. _____

4. (15 p'ts.) Find the limit

$$\lim_{x \rightarrow \infty} [\sqrt{x^2 + 2x} - x]$$

Ans. _____

5. (15 p'ts.) Where if anywhere is g discontinuous? Justify your answer.

$$g(x) = \begin{cases} (x+1)^2 & x < 0 \\ x^2 + 1 & 0 \leq x < 1 \\ 2x + 1 & 1 \leq x \end{cases}$$

Ans. _____

6. (15 p'ts.) Solve for x . $\frac{x-3}{3x+5} \leq -3$.

Ans. _____

7. (10 p'ts.) Find a general equation for the line through $A(7, -3)$ perpendicular to $2x - 5y - 8 = 0$

Ans. _____