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Name ______________________________ September 20, 2007

Math 1571 Test 1

I. Using the differentiation formulas find $\frac{dy}{dx}$ for each of the following:

1. $y = \sqrt{x^3}$
2. $y = \cos(x)$
3. $y = x \sin(x)$
4. $y = \dfrac{(x-1)}{(x-2)}$
5. $y = \dfrac{\sin(x)}{x}$
6. $y = x^4 - 2x^2$

II. Evaluate the following limits:

7. $\lim_{x->9} \dfrac{9-x}{3-\sqrt{x}}$
8. $\lim_{x->0} \dfrac{\sin(5x)}{x}$
9. $\lim_{x->1} \dfrac{x^2-1}{x-1}$

III.

10. Find the equation of the tangent line to the curve $y = \sqrt{x} + 2$ at the point where $(1,3)$.

IV.Sketch each of the following and find the indicated limits.

11. Find $\lim_{x->1}$ of the following:

$$y = \begin{cases} 0 & \text{if } x > 1 \\ 1 & \text{if } x = 1 \\ 0 & \text{if } x < 1. \end{cases}$$

12. Find $\lim_{x->1^+}$ of the following:

$$y = \begin{cases} 0 & \text{if } x > 1 \\ 1 & \text{if } x = 1 \\ 1 & \text{if } x < 1. \end{cases}$$

13. Find $\lim_{x->1}$ of the following:

$$y = \begin{cases} x & \text{if } x > 1 \\ 1 & \text{if } x = 1 \\ x^2 & \text{if } x < 1. \end{cases}$$

V. Sketch the graph and then use the definition of continuity to discuss the continuity at $x = 2$.

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

15. Define P such that the following function is continuous at $x = 3$.

$$f(x) = \begin{cases} \dfrac{(x^2 - 9)}{4x - 12} & \text{if } x \neq 3 \\ P & \text{if } x = 3 \end{cases}$$

VI.

16. Using first principles(the definition of the derivative) find $\frac{dy}{dx}$ at $x = 0$ for $y = x^2$

VII.

17. The position of a particle is given by $s = t^2 - 8t$
    a. Find the velocity at any time t.
    b. When does the particle hit the ground and with what sppeed¿is the particle at rest?