

Name _____

Math 1571

Sample Test 1 Class No Calculators

I. Find the following limits:

1. $\lim_{x \rightarrow 0} \frac{\sin(3x)}{x}$
2. $\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1}$
3. Compute $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ for $f(x) = \sqrt{x}$
4. $\lim_{x \rightarrow \infty} \frac{2x^2 + 7x + 3}{3x^2 + 8x - 3}$
5. If $y = \lim_{x \rightarrow \infty} \frac{\cos(x)}{x}$,

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

6. Find $\lim_{x \rightarrow 0} f(x)$ of the following:

$$f(x) = \begin{cases} +1 & \text{if } x > 0 \\ 0 & \text{if } x = 0 \\ -1 & \text{if } x < 0. \end{cases}$$

7. Find $\lim_{x \rightarrow -1^+} f(x)$

$$f(x) = \begin{cases} -5x - 7 & \text{if } x < -1 \\ 7 & \text{if } x = -1 \\ -5x - 12 & \text{if } x > -1 \end{cases}$$

III. Sketch the graph and then use the definition of continuity to discuss the continuity at the indicated point.

8. $f(x) = \begin{cases} \frac{x^2}{|x|} & \text{if } x > 0 \\ 0 & \text{if } x \leq 0 \end{cases}$
Is it continuous continuous at $x = 0$?
9. $f(x) = \begin{cases} x - 3 & \text{if } x \geq 1 \\ x^2 - 2x - 1 & \text{if } x < 1 \end{cases}$
Is it continuous continuous at $x = 1$?

IV.

10. find the equation of the secant line through $x = 1$ and $x = 2$ for : $y = \frac{1}{x}$

V. Do a 5 part sketch:

11. $y = \frac{x + 6}{x + 3}$
12. $y = \frac{x^2 + 9}{x^2 + 3}$
13. $\lim_{x \rightarrow 0} \frac{\cos(x) - 1}{x}$

21. 5 part Sketch $y = \frac{x-1}{x-4}$

17. If $y = \frac{\cos(x)}{x}$, then $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ when $x = \frac{\pi}{8}$ is:

13. Define P such that the following function is continuous at $x = 9$.

$$f(x) = \begin{cases} \frac{(x^2-81)}{4x-36} & \text{if } x \neq 9 \\ P & \text{if } x = 9 \end{cases}$$

23. $\lim_{x \rightarrow \infty} \frac{\sin(3x)}{x}$

25. $\lim_{x \rightarrow \infty} \frac{9-x}{3-\sqrt{x}}$, $\lim_{x \rightarrow -\infty} \frac{9-x}{3-\sqrt{x}}$

22. The slope of the line tangent to $y = x - 2 \sin x$ at the point $(\frac{\pi}{6})$

18. If $y = \frac{1}{\sqrt[3]{x^2}}$, then $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ when $x = 1$ is:

15. $\lim_{x \rightarrow -3^+} \frac{x^2 + 9}{x + 3}$ is:

16. $\lim_{x \rightarrow -3} \frac{2x^2 + 7x + 3}{3x^2 + 8x - 3}$ is:

Compute the following limits:

1. $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$

2. $\lim_{x \rightarrow 4} \frac{4-x}{2-\sqrt{x}}$

3. Compute $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ for $f(x) = \frac{1}{x}$

4. Find $\lim_{x \rightarrow 0}$ of the following:

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

5. Find $\lim_{x \rightarrow 0}$ of the following:

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

6. $\lim_{x \rightarrow \infty} \frac{2 \sin 3x}{x}$

7. $\lim_{x \rightarrow \infty} \frac{3-\sqrt{x}}{9-x}$

Do the following:

8. Find the equation of the secant line through the points $x = 1$ and $x = 2$ for $y = \sqrt{x} + 1$

9. Sketch the graph and then use the definition of continuity to discuss the continuity at $x = 0$.

$$f(x) = \begin{cases} x & \text{if } x \geq 0 \\ 2x - 1 & \text{if } x < 0 \end{cases}$$

10. Define P such that the following function is continuous at $x = 9$.

$$f(x) = \begin{cases} \frac{(x^2-81)}{4x-36} & \text{if } x \neq 9 \\ P & \text{if } x = 9 \end{cases}$$

Do a 5 part sketch of each of the following:

11. Sketch $y = \frac{x^2 - 9}{x + 1}$

12. Sketch $y = \frac{x - 1}{x - 4}$

I. Find the following limits:

1. $\lim_{x \rightarrow 0} \frac{\sin(3x)}{x}$

2. $\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1}$

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

1. Find $\lim_{x \rightarrow 1}$ of the following:

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

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

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

3. Consider

$$f(x) = \begin{cases} 5x + 7 & \text{if } x < 1 \\ 7 & \text{if } x = 1 \\ 5x + 2 & \text{if } x > 1 \end{cases}$$

Find $\lim_{x \rightarrow 1^+} f(x)$.

III. Find y' for each of the following:

1. If $y = \frac{\sin(x)}{x}$,

2. If $y = \sqrt[3]{x^2}$

3. If $y = \frac{x^2}{2} - \frac{4}{x^2}$

4. If $y = x^4 - x^3 - 3x^2$

5. If $y = \sin(x) \cos(x)$
6. If $y = \tan x(4 - x^2)$

IV.

1. If a ball is thrown into the air with a velocity of 64 ft/s, its height(in feet) after t seconds is given by $y = 64t - 16t^2$.
 - a. find its velocity after 2 second.
 - b. find the time at which the velocity is zero.
 - c. Find when it will hit the ground and the impact speed

V. Find where the following are increasing and decreasing:

1. $f(x) = 2x^3 + 12x^2 + 18x + 1$

VI.

1. Find the equation of the line tangent to $y = x^3 - x^2$ at the point $x = 1$.

III.

find the equation of the tangent line at $x = 1$ for each of the following:

1. $y = \sqrt{(x)} + 1$
2. Find $\lim_{x \rightarrow 1^+}$ of the following:

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

3.

III.

1. The position of a particle is given by $s = t^3 - 3t^2 - 24t$
 - a. Find the velocity at any time t.
 - b. When is the particle at rest?

$$\lim_{x \rightarrow 9} \frac{9 - x}{3 - \sqrt{x}}$$