

HOMEWORK #9

Review Packet for Exam #1

Due Wednesday October 2 at the beginning of class.

Limit Practice Problems

Evaluate the following limits. Be clear if the limit equals a finite value, Does Not Exist, or is $+\infty$ or $-\infty$. Always justify your work:

1. $\lim_{w \rightarrow 0} \frac{16}{w} =$

2. $\lim_{t \rightarrow 2} \frac{3-t}{t-2} =$

3. $\lim_{t \rightarrow 2} \frac{3-t}{(t-2)^2} =$

4. $\lim_{x \rightarrow 4} \frac{(x+2)^2}{x^2-3x-4} =$

5. $\lim_{x \rightarrow 4} \frac{x-4}{x^2-3x-4} =$

6. $\lim_{x \rightarrow 4} \frac{x^2-2x-8}{x^2-3x-4} =$

7. $\lim_{x \rightarrow 1} \frac{x^2-4x-12}{x^2-3x-18} =$

8. $\lim_{x \rightarrow 0} \frac{x^2-4x-12}{x^2-3x-18} =$

9. $\lim_{x \rightarrow -3} \frac{x+2}{x+3} =$

10. $\lim_{x \rightarrow -2} \frac{x^2-4x-12}{x^2-3x-18} =$

11. $\lim_{x \rightarrow 0} \frac{x^2-4x}{x^2-7x} =$

12. $\lim_{x \rightarrow 3} \frac{x^2-9}{|x-3|} =$

13. $\lim_{x \rightarrow -5} \frac{x^2+6x+5}{|x+5|} =$

14. $\lim_{t \rightarrow 1} \frac{t^2-1}{t^2-11t+10} =$

15. $\lim_{t \rightarrow 1} \frac{t^2}{t^2+t-1} =$

16. $\lim_{t \rightarrow -1} \frac{2009(t^2 + 6t + 5)}{t^2 + t} =$
17. $\lim_{x \rightarrow 9} \frac{x^2 - 10x + 9}{x^2 + x - 90} =$
18. $\lim_{t \rightarrow 1} t^{500} + t^{400} + t^{300} + t^{200} + t^{100} =$
19. $\lim_{x \rightarrow 3} \frac{x^2 - x - 6}{x^2 - 2x - 3} =$
20. $\lim_{x \rightarrow 1} \frac{x - 1}{\sqrt{x + 3} - 2} =$
21. $\lim_{x \rightarrow 9} \frac{9x - x^2}{3 - \sqrt{x}} =$
22. $\lim_{x \rightarrow -1} \frac{5}{1 - x} =$
23. $\lim_{x \rightarrow 5} \frac{6x}{5 - x} =$
24. $\lim_{x \rightarrow 2} \frac{x^2 - 9x + 14}{x^2 - 4x + 4} =$
25. $\lim_{x \rightarrow 2} \frac{x^2 - 4}{|x - 2|} =$
26. $\lim_{x \rightarrow 3} \frac{\sqrt{x + 6} - 3}{x^2 - x - 6} =$
27. $\lim_{x \rightarrow 7} \frac{\frac{1}{7} - \frac{1}{x}}{x - 7} =$
28. $\lim_{x \rightarrow -6} \frac{\frac{1}{2 - x} - \frac{1}{8}}{x + 6} =$
29. $\lim_{x \rightarrow 3} \frac{\sqrt{x + 1} - 2}{3 - x} =$
30. $\lim_{x \rightarrow 7} \frac{x^2 - 49}{2 - \sqrt{x - 3}} =$
31. $\lim_{x \rightarrow 5} \frac{\frac{1}{\sqrt{x + 20}} - \frac{1}{5}}{x - 5} = \text{Challenge!}$

Functions and Limit Practice Problems Evaluate the following limits:

32. Let $g(x) = 2x + 1$. Compute $\lim_{x \rightarrow 1} \frac{x - 1}{g(x^2) - 3} =$

33. Let $G(u) = u^2 + u$. Compute $\lim_{u \rightarrow 2} \frac{u^2 - 2u}{G(u - 3)} =$

34. Let $h(y) = y^2 - 3$. Compute $\lim_{x \rightarrow -2} \frac{x + 2}{h(2x) - h(x + 6)} =$

35. Let $f(t) = \frac{1}{t}$. Compute $\lim_{t \rightarrow 4} \frac{f(t - 3) - 4f(t)}{t - 4} =$

More Functions

36. Let $f(x) = \sqrt{x}$, $g(x) = x^2 + 4$, and $h(x) = \frac{1}{x}$. Compute (and simplify, if possible) the following:

(a) $f \circ g(x) =$

(b) $g \circ f(x) =$

(c) $h \circ g \circ f(x) =$

(d) $g \circ g(x) =$

Piece-wise defined functions

Consider each of the following piecewise defined functions. Answer the related questions. *Justify* your answers please.

37. Let $f(x) = \begin{cases} x & \text{if } x < 0 \\ x^2 & \text{if } 0 \leq x \leq 2 \\ 8 - x & \text{if } x > 2 \end{cases}$

Sketch the graph. Find the numbers at which f is discontinuous. Evaluate:

$$\lim_{x \rightarrow 2} f(x) =$$

$$\lim_{x \rightarrow 0} f(x) =$$

38. Let $f(x) = \begin{cases} x - 1 & \text{if } x < 2 \\ 1 & \text{if } 2 < x < 4 \\ 3 & \text{if } x = 4 \\ \sqrt{x} & \text{if } x > 4 \end{cases}$

Sketch the graph. Find the numbers at which f is discontinuous. Evaluate:

$$\lim_{x \rightarrow 0} f(x) =$$

$$\lim_{x \rightarrow 2} f(x) =$$

$$\lim_{x \rightarrow 4} f(x) =$$

$$f(4) =$$

$$39. \text{ Let } h(x) = \begin{cases} \frac{8}{x+2} & \text{if } x < 0 \\ 2 & \text{if } x = 0 \\ \frac{1}{2}x - 4 & \text{if } 0 < x \leq 16 \\ \sqrt{x} & \text{if } x > 16 \end{cases}$$

Sketch the graph. Find the numbers at which h is discontinuous. Evaluate:

$$\lim_{x \rightarrow -2} h(x) =$$

$$\lim_{x \rightarrow 0} h(x) =$$

$$\lim_{x \rightarrow 16} h(x) =$$

$$40. \text{ Let } F(x) = \begin{cases} \frac{1}{x-4} & \text{if } x > 4 \\ 3-x & \text{if } 0 < x < 4 \\ 3-x^2 & \text{if } x < 0 \end{cases}$$

Sketch the graph. Find the numbers at which F is discontinuous. Evaluate:

$$\lim_{x \rightarrow 0} F(x) =$$

$$\lim_{x \rightarrow 4} F(x) =$$