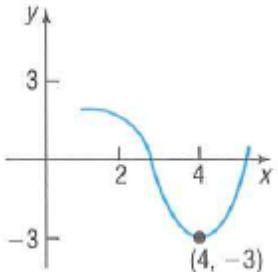
Name: _____

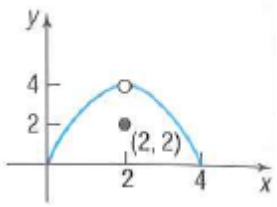
Unit J (limits) Review

For numbers 1 – 4, use the graph shown to determine if the limit exist. If it does, find its value.

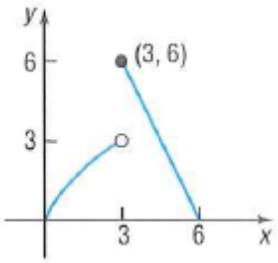
1. $\lim_{x\to 4} f(x)$



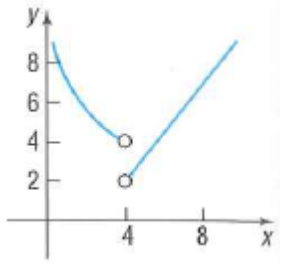
2. $\lim_{x\to 2} f(x)$



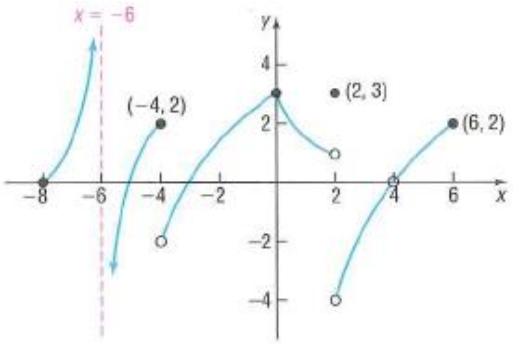
3. $\lim_{x\to 3} f(x)$



4. $\lim_{x\to 4} f(x)$



Use the following graph for numbers 5 – 10.



5. Find: $\lim_{x\to -6^-} f(x)$

6. Find: $\lim_{x\to -6^+} f(x)$

7. Find: $\lim_{x\to -4^-} f(x)$

8. Find: $\lim_{x\to -4^+} f(x)$

9. Find: $\lim_{x\to 2^-} f(x)$

10. Find: $\lim_{x\to 2^+} f(x)$

For numbers 11 – 28, find each limit algebraically.

11. $\lim_{x\to 1} 5$

12. $\lim_{x\to 4} x$

13. $\lim_{x\to -1}\left(3x^2 - 5x\right)$

14. $\lim_{x\to 1}\sqrt{5x+4}$

15. $\lim_{x\to 0}\dfrac{x^2-4}{x^2+4}$

16. $\lim_{x\to 2}\dfrac{x^2-4}{x^2-2x}$

17. $\lim_{x\to -3}\dfrac{x^2-x-12}{x^2-9}$

18. $\lim_{x\to -1}\dfrac{(x+1)^2}{x^2-1}$

19. $\lim_{x\to 1}\dfrac{x^3-x^2+x-1}{x^4-x^3+2x-2}$

20. $\lim_{x\to 2}\dfrac{x^3-2x^2+4x-8}{x^2+x-6}$

21. $\lim_{x\to -\infty}\dfrac{4x+8}{5x}$

22. $\lim_{x\to \infty}\dfrac{2x^2-4x}{x+1}$

23. $\lim_{x\to \infty}\dfrac{5x+5}{7x^2+1}$

24. $\lim_{x\to -\infty} -5x^2-2x$

25. $\lim_{x\to \infty} 3x^6+2x^3-4$

26. $\lim_{x\to 4}\dfrac{\sqrt{x}+2}{x-4}$

27. $\lim_{x\to 4}\dfrac{\sqrt{x}-2}{x-4}$

28. $\lim_{x\to -\infty} \sin x$

For numbers 29 – 30, a piecewise function is given. Use properties of limits to find the indicated limit, or state that the limit does not exist.

29. $f(x)=\begin{cases} x-7 \text{ if } x<4 \\ 2x+3 \text{ if } x\geq 4 \end{cases}$

a) $\lim_{x\to 4^-} f(x)$ b) $\lim_{x\to 4^+} f(x)$ c) $\lim_{x\to 4} f(x)$

30. $f(x)=\begin{cases} x^2-7 \text{ if } x<8 \\ x^3+2 \text{ if } x\geq 8 \end{cases}$

Find $\lim_{x\to 8} f(x)$

For numbers 31 – 32, find the slope of the tangent line to the graph of *f* at the given point <u>using the difference quotient.</u>

$$f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$$

31. $f(x) = 3x + 5$ at (1, 8)

32. $f(x) = x^2 - 2x + 3$ at (–1, 6)

For numbers 33 –34, find the equation for the slope of the function at any point <u>using the difference quotient</u>

$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$. Then use your answer to find the slope of the tangent line at $x = 4$.

33. $f(x) = -4x + 5$

34. $f(x) = 2x^2 + 3x$,

For numbers 45 – 60, use the theorems to find $f'(x)$. Express answers without using fractional or negative exponents.

35. $f(x) = 12x^5$

36. $f(x) = 3x^{-7}$

37. $f(x) = x^3 - 2x + 1$

38. $f(x) = 8$

39. $f(x) = \frac{10}{\sqrt{x}} - 2x$

40. $f(x) = 2x^{3/2} - 3x^{-1/3}$

41. $f(x) = 2\sqrt[3]{x} + 3$

42. $f(x) = x\left(3x^2 - \sqrt{x}\right)$

43. $f(x) = \frac{3}{x^3} - \frac{8}{x^2} + \frac{1}{x}$

44. $f(x) = 3x^3 - 2\sqrt{x}$

45. $f(x) = x^9 - 3x^5 + 4x^2 + x$

46. $f(x) = \frac{-4}{x^3} - 2x^6 + 2\sqrt[3]{x^2}$

47. $n(x) = (3x^2 - 2x)(x^3 + x^2)$

48. $r(x) = \frac{3x - 1}{x^2 + 2}$

49. $h(x) = (-4 + 2x^2)(2x + 3)$

50. $k(x) = \frac{3x^3 + 4}{2x^2 - 1}$