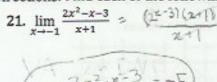


Directions: Find each of the following limits by hand, simplify your answers. Use appropriate notation.



22. 
$$\lim_{x \to -1} \frac{x^{3+1}}{x+1} = \frac{(x^{3+1})(x^{2+1} - x)}{(x^{2+1})}$$

$$1 + 1 + 1 = 3$$

$$1 + 1 + 1 = 3$$

23. 
$$\lim_{x \to 5} \frac{5-x}{x^2-25} = \frac{(x-5)}{(x-5)}(x+5)$$

$$\lim_{x \to 5} \frac{5-x}{x^2-25} = \frac{1}{(x-5)}(x+5)$$

24. 
$$\lim_{x\to 3} \frac{\sqrt{x+1}-2}{x-3} \cdot \frac{\sqrt{x+1}+2}{\sqrt{x+1}+2} \cdot \frac{(x-3)}{(x-3)(\sqrt{x+1}+2)}$$

$$25 \left( \lim_{x \to 0} \frac{\sin x}{x} > 1 \right)$$

26. 
$$\lim_{x \to 0} \frac{\sin 5x}{x} \cdot \frac{6}{5} = \frac{5 \sin 5x}{8x}$$

$$\lim_{x \to 0} \frac{\sin 5x}{x} \cdot \frac{6}{5} = \frac{5 \sin 5x}{8x}$$

Directions: Complete the problems below.

 Determine the value for a and b to ensure that f(x) is continuous.

$$f(x) = \begin{cases} x - 1, & \text{if } x \le -1 \\ ax + b, -1 < x < 1 \\ 2x + 1, x \ge 1 \end{cases}$$

$$= -2 \qquad b - a = -2 \qquad b - 3 \cdot b = -2$$

$$= -\frac{5}{2} \qquad a + b = 3 \qquad 2b = 1$$

$$= -\frac{5}{2} \qquad a = 3 \cdot b \qquad 3 \cdot b = -2$$

28. Given  $\lim_{x \to 3} f(x) = 7$  and  $\lim_{x \to 2} g(x) = 3$ , find:

A. 
$$\lim_{x\to 3}(f(x)+g(x))=|\bigcirc$$

B. 
$$\lim_{x\to 3} \left(\frac{f(x)}{g(x)}\right) = \frac{7}{3}$$

C. 
$$\lim_{x\to 3} (f(x)g(x)) = 1$$

Directions: Determine whether or not the Intermediate Value Thm applies in each situation. If so, find c.

29. 
$$f(x) = x^2 - 4$$

$$f(c) = 221 \text{ on } [4,20]$$

$$f(x) = 22100(4,20)$$

$$f(x) = 30. f(x) = 30.$$

30.  $f(x) = \frac{x-1}{x^2-2x+1}$ f(c) = -1 on (-1,1)

f(1) is not continues from [-1,1] so IVI doesn't apply

Directions: Use the definition of the derivative to find f'(x) or f'(t). Show correct limit symbolism.

31. 
$$f(x) = x^2 - 1$$

$$\lim_{h\to 0} \frac{(x-h)^2 - 1 + x^2 - 1}{h} = \frac{10^2 + 2xh + h^2 + 11412^2 + 11}{y} = 2x + \frac{1}{y}$$

$$f(x) = 2x$$

32. 
$$f(t) = t^3 - 12t$$

$$\frac{(++h)^3-12(++h)-+^3+12+}{h} = \frac{(++h)^3-12(++h)-+^3+12+}{h} = \frac{(++h)^3-12(++h)^3-12(++h)-+^3+12+}{h} = \frac{(++h)^3-12(+h)^3-12(-h)^3-12(-h)$$

Directions: Use the alternate form of the limit definition of the derivative to find the indicated derivative.

33. 
$$f(x) = x^2 - 1$$
,  $f'(2)$ 

$$\frac{1}{2} = \frac{x^{2} - 4}{x^{2}} = \frac{x^{2} - 4}{x^{2}} = \frac{(x-2)(x+2)}{(x-2)}$$

$$= \frac{(x-2)(x+2)}{(x-2)}$$

34. 
$$f(x) = \frac{1}{x}, f'(3)$$

$$\lim_{M \to 0} 3 + 2 + 3 |_{M} + |_{M} = 1$$

$$\lim_{M \to 0} 3 + x = 3 + 2 + 12$$

$$\lim_{x \to 3} \frac{\frac{1}{2} - \frac{1}{3}}{x - 3} = \frac{3 - x}{x - 3} = \frac{3 + 2 + 12}{x + 3}$$

$$\lim_{x \to 3} \frac{\frac{1}{2} - \frac{1}{3}}{x - 3} = \frac{3 + 2 + 12}{x - 3} = \frac{1}{3x}$$