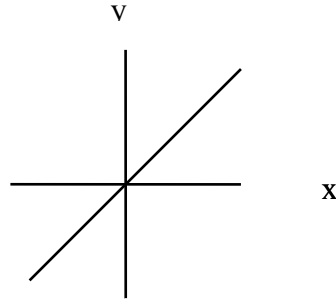


Practice limits only if you are interested in reviewing where the rules originate. To practice calculus problems start on page three with power rules.

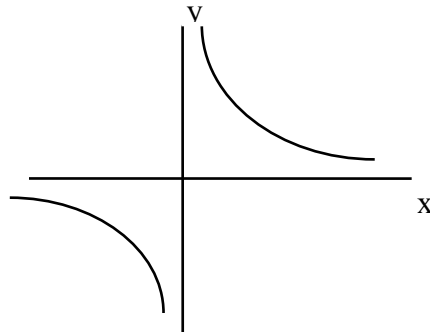
Topic: Limits

For each of the following use the graph to find the value of the limit asked or determine that the limit does not exist

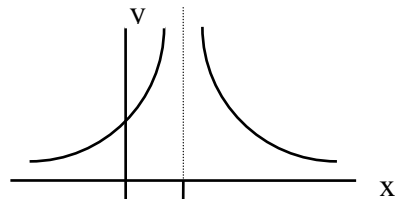
$$\lim_{x \rightarrow 0} \frac{x^2}{x}$$



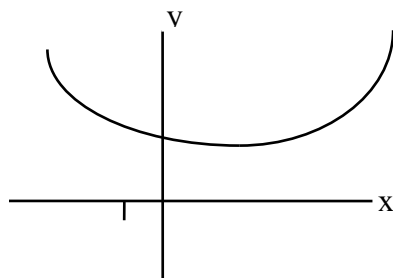
$$\lim_{x \rightarrow 0} \frac{1}{\sqrt[3]{x}}$$



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



$$\lim_{x \rightarrow -1} \frac{x^3 + 1}{x + 1}$$



Find the following limits:

1. $\lim_{x \rightarrow 3} 2x$

2. $\lim_{x \rightarrow 0} (x^2 - 3x + 4)$

3. $\lim_{x \rightarrow 1} \frac{3x-1}{x-1}$

4. $\lim_{x \rightarrow -5} \frac{x^2 - 25}{x + 5}$

5. $\lim_{x \rightarrow 3} \frac{2x^2 + x - 21}{x - 3}$

6. $\lim_{x \rightarrow 2} \frac{\frac{x}{x+1} - \frac{2}{3}}{x - 2}$

7. $\lim_{x \rightarrow 2} \frac{3x^2 - x - 10}{x^2 + 5x - 14}$

8. $\lim_{x \rightarrow \infty} \frac{x^2 + x}{x^3 - x^2}$

9. $\lim_{x \rightarrow \infty} \frac{x^2}{x^2 + 1}$

Topic: The Derivative

Find $f'(x)$ using the formula

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

1. $f(x) = 5 - 4x$

2. $f(x) = x + 1$

3. $f(x) = x^2 + 4x - 8$

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

5. $f(x) = \frac{3}{x+1}$

6. $f(x) = \sqrt{x+2}$

Topic: The Power Rule

Find the Derivative using the Power Rule and the Sums and Differences Rule

1. $f(x) = x^2 - 7x + 3$

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

3. $f(x) = x^{2/3} - 4x^{1/3}$

4. $f(x) = 2x^{1.3} + 5x^{0.5}$

5. $f(x) = \sqrt{x} (2x + 1)$

6. $f(x) = \frac{(x+1)^2}{4x}$

Find:

7. $f'(2)$ if $f(x) = 3x^2 + 4x - 2$

8. $f'(1)$ if $f(x) = x^2 + x^{-2}$

Topic: Product and Quotient Rules

Find:

1. $\frac{d}{dx}((x^2 + 1)(2x^2 - 3x + 1))$

2. $f'(x)$ if $f(x) = (x + x^{-1})(x - x^{-1})$

3. $\frac{dy}{dx}$ if $y = \frac{3x}{x^2 + 1}$

4. $\frac{dy}{dx}$ if $y = \frac{3x + 1}{2x - 1}$

5. $f'(2)$ if $f(x) = \frac{x^2 + 9}{x}$

6. $\frac{d}{dx}\left(\frac{x+1}{x-1}\right)$

7. $f'(16)$ if $f(x) = (1 + \sqrt{x})(x + \sqrt{x})$

$$8. \frac{dy}{dx} \text{ if } y = \frac{x^2 - 4x + 2}{x^2 + x + 1}$$

$$9. f'(x) \text{ if } f(x) = 7 - \frac{4}{x-8} + \frac{2x}{3x+1}$$

$$10. f'(x) \text{ if } f(x) = \frac{(2x-1)(3x+4)}{4x+1}$$

Topic: The Chain Rule

Find $\frac{dy}{dx}$

$$1. y = (3x+2)^6$$

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

$$3. y = (x^2 - 2)^{-3}$$

$$4. y = \frac{2}{\sqrt{8x-1}}$$

$$5. y = \sqrt[3]{7x} + \sqrt[3]{7x}$$

$$6. y = x^2(x-4)^5$$

$$7. y = \frac{2x-5}{(x^2+4)^3}$$

$$8. y = \sqrt[3]{\frac{8x^2-3}{x^2+2}}$$

Topic: Exponential and Logarithms Rules

Find $\frac{dy}{dx}$

1. $y = 4\ln x$

2. $y = \ln(3x - 4)$

3. $y = \ln(1 - x^2)$

4. $y = \ln(ax^2 + b)$

5. $y = x^2 \ln x$

6. $y = \ln \left[\frac{2x+3}{3x-4} \right]$

7. $y = \ln \sqrt{\frac{x^4-1}{x^4+1}}$

8. $y = \frac{x^2-1}{\ln x}$

9. $y = \sqrt{4 + \ln x}$

10. $y = \ln(x^2 \sqrt{3x-2})$

11. $y = [\ln(2x+3)]^2$

12. $y = 7e^x$

13. $y = e^{x^2+1}$

14. $y = \frac{e^x + e^{-x}}{2}$

15. $y = x^2 e^{-x^2}$

16. $y = e^{1+\sqrt{x}}$

17. $y = e^{h^x}$

18. $y = e^{2x}(x+1)$

19. $y = \ln e^{4x+1}$

20. $y = (e^{3x} + 1)^4$