

This worksheet is worth 25 points. You MUST show work to receive full credit.
You may use your book and notes. Tutors may assist you with these problems, but the work must be your own.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the derivative.

1) $y = 5x^4 + 5x^3 + 2$ 1) _____
A) $20x^3 + 15x^2 - 7$ B) $20x^3 + 15x^2$ C) $4x^3 + 3x^2$ D) $4x^3 + 3x^2 - 7$

Find the derivative of the function by first expanding or simplifying the expression.

2) $f(x) = \frac{5x^2 + 35x}{5x}$ 2) _____
A) $f(x) = 10x$ B) $f'(x) = x + 7$ C) $f'(x) = 5$ D) $f'(x) = 1$

3) $f(x) = (6x - 2)(4x + 1)$ 3) _____
A) $f'(x) = 24x - 2$ B) $f'(x) = 48x - 2$ C) $f'(x) = 48x - 1$ D) $f'(x) = 48x - 14$

Find y' .

4) $y = (3x^3 + 5)(3x^7 - 8)$ 4) _____
A) $90x^9 + 105x^6 - 72x$ B) $12x^9 + 105x^6 - 72x^2$
C) $90x^9 + 105x^6 - 72x^2$ D) $12x^9 + 105x^6 - 72x$

Find the derivative.

5) $y = \frac{4}{x} + 2 \sec x$ 5) _____
A) $y' = -\frac{4}{x^2} + 2 \tan^2 x$ B) $y' = -\frac{4}{x^2} + 2 \sec x \tan x$

C) $y' = \frac{4}{x^2} - 2 \sec x \tan x$ D) $y' = -\frac{4}{x^2} - 2 \csc x$

6) $y = (\csc x + \cot x)(\csc x - \cot x)$ 6) _____
A) $y' = -\csc^2 x$ B) $y' = -\csc x \cot x$
C) $y' = 1$ D) $y' = 0$

7) $s = t^4 - \csc t + 7$

A) $\frac{ds}{dt} = 4t^3 + \cot^2 t$

C) $\frac{ds}{dt} = 4t^3 + \csc t \cot t$

B) $\frac{ds}{dt} = t^3 - \cot^2 t + 7$

D) $\frac{ds}{dt} = 4t^3 - \csc t \cot t$

7) _____

Find the derivative of the function.

8) $q = \sqrt{19r - r^5}$

A) $\frac{1}{2\sqrt{19r - r^5}}$

B) $\frac{-5r^4}{\sqrt{19r - r^5}}$

C) $\frac{19 - 5r^4}{2\sqrt{19r - r^5}}$

D) $\frac{1}{2\sqrt{19 - 5r^4}}$

8) _____

Find dy/dt.

9) $y = \cos^6(\pi t - 16)$

A) $-6\pi \sin^5(\pi t - 16)$

C) $-6\pi \cos^5(\pi t - 16) \sin(\pi t - 16)$

B) $-6 \cos^5(\pi t - 16) \sin(\pi t - 16)$

D) $6 \cos^5(\pi t - 16)$

9) _____

Find the derivative of the function.

10) $y = (x + 1)^2(x^2 + 1)^{-3}$

A) $\frac{-2(x + 1)(2x^2 + 3x - 1)}{(x^2 + 1)^4}$

B) $\frac{2(x + 1)(2x^2 - 3x - 1)}{(x^2 + 1)^4}$

C) $\frac{-2(x + 1)(2x^2 - 3x - 1)}{(x^2 + 1)^4}$

D) $\frac{2(x + 1)(2x^2 + 3x - 1)}{(x^2 + 1)^4}$

10) _____

Find the indicated derivative.

11) Find y'' if $y = 6x \sin x$.

A) $y'' = -12 \cos x + 6x \sin x$

C) $y'' = 12 \cos x - 6x \sin x$

B) $y'' = -6x \sin x$

D) $y'' = 6 \cos x - 12x \sin x$

11) _____

Find the derivative of y with respect to x, t, or θ , as appropriate.

12) $y = e^{\sin t} (\ln t^5 + 10)$

A) $e^{\sin t} \left[(\cos t)(\ln t^5 + 10) + \frac{5}{t} \right]$

C) $e^{\cos t} (\cos t)(\ln t^5 + 10) + \frac{5e^{\sin t}}{t}$

B) $e^{\sin t} \left[\ln t^5 + 10 + \frac{5}{t} \right]$

D) $\frac{5e^{\sin t} \cos t}{t}$

12) _____

13) $y = 10e^\theta (\sin \theta - \cos \theta)$

A) $20e^\theta \sin \theta$

C) 0

B) $20e^\theta (\sin \theta - \cos \theta)$

D) $10e^\theta (\sin \theta - \cos \theta) + 10e^\theta$

13) _____

14) $y = e^5 - 3x$

A) e^{-3}

B) $-3e^5 - 3x$

C) $5e^5 - 3x$

D) $-3 \ln(5 - 3x)$

14) _____

Find the derivative of y with respect to x , t , or θ , as appropriate.

15) $y = \ln \frac{1-x}{(x+3)^3}$ 15) _____

- A) $\ln \frac{4x-6}{(x+3)^4}$ B) $\frac{(x+3)^3}{1-x}$ C) $\frac{2x-6}{(x+3)(1-x)}$ D) $\frac{2x-6}{(x+3)^4}$

Find the derivative of y with respect to x , t , or θ , as appropriate.

16) $y = (x^2 - 2x + 8) e^x$ 16) _____

- A) $\left(\frac{x^3}{3} + 6x + 8\right) e^x$ B) $(x^2 + 4x + 6) e^x$
 C) $(2x - 2) e^x$ D) $(x^2 + 6) e^x$

Find the derivative of y with respect to x , t , or θ , as appropriate.

17) $y = x^4 \ln x - \frac{1}{3}x^3$ 17) _____

- A) $x^3 - x^2 + 4x^3 \ln x$ B) $4x^3 - x^2$
 C) $x^4 \ln x - x^2 + 4x^3$ D) $5x^3 - x^2$

Use implicit differentiation to find dy/dx .

18) $y \cos\left(\frac{1}{y}\right) = 7x + 7y$ 18) _____

- A) $\frac{7y}{\sin\left(\frac{1}{y}\right) + y \cos\left(\frac{1}{y}\right) - 7y}$ B) $\frac{7 - y \sin\left(\frac{1}{y}\right)}{\cos\left(\frac{1}{y}\right) - 7}$
 C) $\frac{7}{\sin\left(\frac{1}{y}\right) + y \cos\left(\frac{1}{y}\right) - 7}$ D) $\frac{7y^2}{\sin\left(\frac{1}{y}\right) - 7y^2}$

19) $\frac{x+y}{x-y} = x^2 + y^2$ 19) _____

- A) $\frac{x(x-y)^2 - y}{x + y(x-y)^2}$ B) $\frac{x(x-y)^2 - y}{x - y(x-y)^2}$ C) $\frac{x(x-y)^2 + y}{x - y(x-y)^2}$ D) $\frac{x(x-y)^2 + y}{x + y(x-y)^2}$

Find the derivative of y with respect to the independent variable.

20) $y = 8^{\cos \pi \theta}$ 20) _____

- A) $-\pi 8^{\cos \pi \theta} \ln 8 \sin \pi \theta$ B) $\pi 8^{\cos \pi \theta} \ln 8$
 C) $-8^{\cos \pi \theta} \ln 8 \sin \pi \theta$ D) $8^{\cos \pi \theta}$

Use l'Hopital's Rule to evaluate the limit.

$$21) \lim_{x \rightarrow 0} \frac{\cos 5x - 1}{x^2}$$

21) _____

A) $-\frac{25}{2}$

B) $\frac{25}{2}$

C) 0

D) $\frac{5}{2}$

Use logarithmic differentiation to find the derivative of y.

$$22) y = \sqrt{\frac{x}{x+5}}$$

22) _____

A) $\frac{5}{2} \sqrt{\frac{x}{x+5}}$

B) $\left(\frac{1}{2}\right) \left(\frac{1}{x} - \frac{1}{x+5}\right)$

C) $\left(\frac{1}{2}\right) (\ln x - \ln(x+5))$

D) $\left(\frac{1}{2}\right) \sqrt{\frac{x}{x+5}} \left(\frac{1}{x} - \frac{1}{x+5}\right)$

Solve the problem.

23) Find the points where the graph of the function have horizontal tangents.

23) _____

$$f(x) = x^3 - 9x$$

A) $(-\sqrt{3}, 6\sqrt{3}), (\sqrt{3}, -6\sqrt{3})$

B) $(-\sqrt{3}, 18\sqrt{3}), (0,0), (\sqrt{3}, -18\sqrt{3})$

C) $(-3, 0), (\sqrt{3}, 0)$

D) $(\sqrt{3}, -18\sqrt{3})$

24) Find an equation of the tangent to the curve $f(x) = 2x^2 - 2x + 1$ that has slope 2.

24) _____

A) $y = 2x - 1$

B) $y = 2x + 1$

C) $y = 2x + 2$

D) $y = 2x$

Find the slope of the curve at the indicated point.

$$25) y = \frac{4}{9+x}, x = 5$$

25) _____

A) $m = -\frac{1}{49}$

B) $m = \frac{2}{7}$

C) $m = -\frac{2}{7}$

D) $m = \frac{1}{49}$