TEST # 3 Section_____, Date_____ Name_____

Find an equation for the tangent to the curve at the given point.

1) $f(x) = 2\sqrt{x} - x + 7$, (4, 7) 1) _____

A) $y = \frac{1}{2}x - 9$ B) $y = 7$ C) $y = -\frac{1}{2}x + 7$ D) $y = -\frac{1}{2}x + 9$

Calculate the derivative of the function. Then find the value of the derivative as specified.

2) $f(x) = \frac{8}{x + 2}$; $f'(0)$ 2) _____

A) $f'(x) = -8(x + 2)^2$; $f'(0) = -32$ B) $f'(x) = 8$; $f'(0) = 8$

C) $f'(x) = -\frac{8}{(x + 2)^2}$; $f'(0) = -2$ D) $f'(x) = \frac{8}{(x + 2)^2}$; $f'(0) = 2$

Find the derivative.

3) $y = \frac{1}{7x^2} + \frac{1}{7x}$ 3) _____

A) $-\frac{2}{7x} - \frac{1}{7x^2}$ B) $\frac{2}{7x^3} + \frac{1}{7x^2}$ C) $-\frac{1}{7x^3} + \frac{1}{7x^2}$ D) $-\frac{2}{7x^3} - \frac{1}{7x^2}$

Find y ′.

4) $y = (x^2 - 2x + 2)(2x^3 - x^2 + 5)$ 4) _____

A) $2x^4 - 20x^3 + 18x^2 + 6x - 10$ B) $10x^4 - 16x^3 + 18x^2 + 6x - 10$

C) $10x^4 - 20x^3 + 18x^2 + 6x - 10$ D) $2x^4 - 16x^3 + 18x^2 + 6x - 10$

Find the derivative.

5) $s = \frac{8e^t}{2e^t + 1}$ 5) _____

A) $\frac{8e^t}{(2e^t + 1)}$ B) $\frac{8e^t}{(2e^t + 1)^3}$ C) $\frac{8e^t}{(2e^t + 1)^2}$ D) $\frac{e^t}{(2e^t + 1)^2}$

Provide an appropriate response.

6) Find all points (x, y) on the graph of $f(x) = 2x^2 - 3x$ with tangent lines parallel to the line $y = 5x + 3$. 6) _____

A) (2, 8) B) (0, 0), (2, 2) C) (2, 2) D) (4, 2)

Find the derivative.

7) $y = (\csc x + \cot x)(\csc x - \cot x)$ 7) _____

A) $y' = 1$ B) $y' = -\csc^2 x$

C) $y' = -\csc x \cot x$ D) $y' = 0$

Find the indicated derivative.

8) Find y'' if $y = 7x \sin x$. 8) _____

A) $y'' = -14 \cos x + 7x \sin x$ B) $y'' = -7x \sin x$

C) $y'' = 7 \cos x - 14x \sin x$ D) $y'' = 14 \cos x - 7x \sin x$

Solve the problem.

9) Find all points on the curve $y = \sin x$, $0 \le x \le 2\pi$, where the tangent line is parallel to the line $y = \frac{1}{2}x$. 9) _____

A) $\left(\frac{\pi}{6}, \frac{1}{2}\right), \left(\frac{11\pi}{6}, -\frac{1}{2}\right)$

B) $\left(\frac{\pi}{3}, \frac{\sqrt{3}}{2}\right), \left(\frac{5\pi}{3}, -\frac{\sqrt{3}}{2}\right)$

C) $\left(\frac{\pi}{3}, \frac{\sqrt{3}}{2}\right), \left(\frac{2\pi}{3}, \frac{\sqrt{3}}{2}\right)$

D) $\left(\frac{\pi}{3}, \frac{1}{2}\right), \left(\frac{2\pi}{3}, \frac{1}{2}\right)$

10) Find the tangent to $y = \cot x$ at $x = \frac{\pi}{4}$. 10) _____

A) $y = 2x - \frac{\pi}{2} + 1$ B) $y = -2x + \frac{\pi}{2} + 1$ C) $y = 2x + 1$ D) $y = -2x + \frac{\pi}{2}$

Find the derivative of the function.

11) $y = x^5 \cos x - 6x \sin x - 6 \cos x$ 11) _____

A) $x^5 \sin x - 5x^4 \cos x + 6x \cos x$

B) $-5x^4 \sin x - 6 \cos x + 6 \sin x$

C) $-x^5 \sin x + 5x^4 \cos x - 6x \cos x$

D) $-x^5 \sin x + 5x^4 \cos x - 6x \cos x - 12 \sin x$

12) $r = (\sec \theta + \tan \theta)^{-5}$ 12) _____

A) $-5(\sec \theta + \tan \theta)^{-6}(\tan^2 \theta + \sec \theta \tan \theta)$

B) $\frac{-5 \sec \theta}{(\sec \theta + \tan \theta)^5}$

C) $-5(\sec \theta \tan \theta + \sec^2 \theta)^{-6}$

D) $-5(\sec \theta + \tan \theta)^{-6}$

Find dy/dt.

13) $y = \left(e^{\cos(t/9)}\right)^4$ 13) _____

A) $\frac{4}{9} \cos\left(\frac{t}{9}\right) e^{4 \cos(t/9)}$

B) $-\frac{4}{9}\left(e^{\sin(t/9)}\right)^3$

C) $\frac{4}{9} \sin\left(\frac{t}{9}\right) e^{3 \cos(t/9)}$

D) $-\frac{4}{9} \sin\left(\frac{t}{9}\right) e^{4 \cos(t/9)}$

Provide an appropriate response.

14) Find y' for $y = y(x)$ defined implicitly by $5y^2 - 8x^4 + 3 = 0$, and evaluate y' at $(x, y) = (1, 1)$. 14) _____

A) $y' = \frac{11x^2}{5y^2}$; $y'|_{(1, 1)} = \frac{11}{5}$

B) $y' = \frac{16x^2}{5y^2}$; $y'|_{(1, 1)} = \frac{16}{5}$

C) $y' = \frac{16x^3}{5y}$; $y'|_{(1, 1)} = \frac{16}{5}$

D) $y' = \frac{11x^3}{5y}$; $y'|_{(1, 1)} = \frac{11}{5}$

Use implicit differentiation to find dy/dx.

15) $y\sqrt{x + 1} = 4$ 15) _____

A) $\frac{y}{2(x + 1)}$ B) $-\frac{2y}{x + 1}$ C) $-\frac{y}{2(x + 1)}$ D) $\frac{2y}{x + 1}$

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

16) $y = \ln(\ln 7x)$ 16) _____

A) $\frac{1}{\ln 7x}$ B) $\frac{1}{x}$ C) $\frac{1}{7x}$ D) $\frac{1}{x \ln 7x}$

Find the derivative of y with respect to x.

17) $y = \cos^{-1}(9x^2 + 4)$ 17) _____

A) $\frac{9}{\sqrt{1 + (9x^2 + 4)^2}}$ B) $\frac{-18x}{\sqrt{1 - (9x^2 + 4)^2}}$

C) $\frac{18x}{\sqrt{1 - (9x^2 + 4)^2}}$ D) $\frac{18x}{1 + (9x^2 + 4)^2}$

18) $y = \sin^{-1}\left(\frac{1}{x^4}\right)$ 18) _____

A) $\frac{-4}{x\sqrt{1 - x^8}}$ B) $\frac{-4}{1 + x^8}$ C) $\frac{-4}{x\sqrt{x^8 - 1}}$ D) $\frac{-4x^4}{\sqrt{1 - x^8}}$

19) $y = \sin^{-1}(e^{3t})$ 19) _____

A) $\frac{e^{3t}}{\sqrt{1 - e^{6t}}}$ B) $\frac{-3e^{3t}}{\sqrt{1 - e^{6t}}}$ C) $\frac{3e^{3t}}{\sqrt{1 - e^{9t}}}$ D) $\frac{3e^{3t}}{\sqrt{1 - e^{6t}}}$

Find the derivative of the function.

20) $y = \log_5 (3x^2 - 2x)^{5/2}$ 20) _____

A) $\frac{5}{\ln 5 (3x^2 - 2x)}$ B) $\frac{5(3x - 1)}{\ln 5(3x^2 - 2x)}$ C) $\frac{\ln 5 (3x - 1)}{(3x^2 - 2x)}$ D) $\frac{10(3x - 1)}{\ln 5 (3x^2 - 2x)}$

21) $y = 3 \ln \sin^2 4x$ 21) _____

A) $24 \cot 4x$ B) $\frac{6}{\ln \sin 4x}$ C) $8 \tan 4x$ D) $\frac{24}{\sin 4x}$

Use logarithmic differentiation to find the derivative of y with respect to the independent variable.

22) $y = x^{6 \sin x}$ 22) _____

A) $6x^{6 \sin x}\left(\cos x \ln x + \frac{\sin x}{x}\right)$ B) $6 \sin x \ln x$

C) $x^{\sin x}\left(\cos x \ln x + \frac{\sin x}{x}\right)$ D) $6 \cos x \ln x + \frac{\sin x}{x}$