

MAC2311
Ref. #: 829232
Term: Spring 2015 (2014_2)
Exam #3

Name _____

Grade _____

Student ID _____

Date _____

SHORT ANSWER. Show ALL work NEATLY in the space provided, and write the final answer on the answer line. No credit will be given if work is not shown or is not legible.

Find the second derivative.

1) $y = 3x^3 - 5x^2 + 8$

1) _____

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

2) $y = 5^x$

2) _____

Solve the problem.

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

$$f(x) = x^3 - 12x$$

3) _____

Find the derivative of the function.

$$4) s = \sin\left(\frac{9\pi t}{2}\right) - \cos\left(\frac{9\pi t}{2}\right)$$

4) _____

Find y' .

$$5) y = \sin(3x^2e^x)$$

5) _____

Use implicit differentiation to find dy/dx .

6) $2xy - y^2 = 1$

6) _____

Find the value of df^{-1}/dx at $x = f(a)$.

7) $f(x) = 4x + 9, a = -1$

7) _____

Use a reference triangle in an appropriate quadrant to find the angle.

8) $\tan^{-1}(1)$

8) _____

Find the derivative of y with respect to x .

9) $y = \cos^{-1}(3x^2 - 2)$

9) _____

Use a reference triangle in an appropriate quadrant to find the angle.

10) $\sin^{-1} \frac{\sqrt{3}}{2}$

10) _____

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

11) $y = \ln(\cos(\ln \theta))$

11) _____

Solve the problem. Round your answer, if appropriate.

- 12) The volume of a sphere is increasing at a rate of $7 \text{ cm}^3/\text{sec}$. Find the rate of change of its surface area when its volume is $\frac{4\pi}{3} \text{ cm}^3$. (Do not round your answer.)

12) _____

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

13) $y = \log_{14} e^x - \log_5 \sqrt{x}$

13) _____

Use logarithmic differentiation to find the derivative of y .

14) $y = x(x - 8)(x + 5)$

14) _____

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

15) $y = 10^{\cos \pi \theta}$

15) _____

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

16) $y = (x + 3)^x$

16) _____

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

17) $y = 7^{\ln 9t}$

17) _____

At the given point, find the slope of the curve, the line that is tangent to the curve, or the line that is normal to the curve, as requested.

18) $y^2 + x^2 = y + 2x$, tangent at (0, 1)

18) _____

Find $\frac{dy}{dx}$, using logarithmic differentiation.

19) $\sin y = 5x + 5y$

19) _____

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

20) $y = \log_4 t + \log_4 t^2$

20) _____

Use logarithmic differentiation to find the derivative of y with respect to the independent variable (5 points Extra Credit).

21) $y = x^{8 \sin x}$

21) _____

Answer Key

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1) $18x - 10$

2) $5^x \ln 5$

3) $(-\sqrt{7}, 14\sqrt{7}), (\sqrt{7}, -14\sqrt{7})$

4) $\frac{9\pi}{2} \cos\left(\frac{9\pi t}{2}\right) + \frac{9\pi}{2} \sin\left(\frac{9\pi t}{2}\right)$

5) $3(x^2 + 4x + 2)e^x \cos(3x^2e^x) - 9xe^{2x}(x^3 + 4x^2 + 4x) \sin(3x^2e^x)$

6) $\frac{y}{y-x}$

7) $\frac{1}{4}$

8) $\frac{\pi}{4}$

9) $\frac{-6x}{\sqrt{1 - (3x^2 - 2)^2}}$

10) $\frac{\pi}{3}$

11) $-\frac{\tan(\ln \theta)}{\theta}$

12) $14 \text{ cm}^2/\text{sec}$

13) $\frac{-10}{(x+5)(x-5)}$

14) $x(x-8)(x+5)\left(\frac{1}{x} + \frac{1}{x-8} + \frac{1}{x+5}\right)$

15) $-\pi 10^{\cos \pi \theta} \ln 10 \sin \pi \theta$

16) $(x+3)^x \left(\ln(x+3) + \frac{x}{x+3}\right)$

17) $\frac{\ln 7}{t} 7^{\ln 9t}$

18) $y = 3x + 1$

19) $\frac{5}{\cos y - 5}$

20) $\frac{-10}{(x+5)(x-5)}$

21) $8x^8 \sin x \left(\cos x \ln x + \frac{\sin x}{x}\right)$