Exam

Name_____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

1) Find an equation of the tangent line to the curve $y = \ln(x + 3)$ when $x = -2$. 1) _____

2) Find y' if $y = \ln(2x^2 - 3)$. 2) _____

3) Find y' if $y = \log_2(4x + 5)$. 3) _____

4) Find y' if $y = \ln(x^2) + \ln^3 x$. 4) _____

5) Find y' if $y = \ln\sqrt{\frac{x - 1}{x + 1}}$. 5) _____

6) Find y' if $y = \ln\left[(x^2 + 5)^5(3 - 4x)^4\right]$. 6) _____

7) Find y' if $y = x^3 \ln(4x + 5)$. 7) _____

8) Find y' if $y = \ln[\ln(2x + 3)]$. 8) _____

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

9) If $y = \ln\sqrt{2x + 7}$, then $y' =$ 9) _____

A) $\frac{2}{\sqrt{2x + 7}}$.

B) $\sqrt{(2x + 7)^3}$.

C) $\frac{1}{\sqrt{2x + 7}}$.

D) $\frac{1}{\sqrt{(2x + 7)^3}}$.

E) $\frac{1}{2x + 7}$.

10) If $y = \ln\left(\frac{x^2 - 4x - 5}{x + 2}\right)$, then $\frac{dy}{dx} =$ 10) _____

A) $\left(\frac{x^2 - 4x - 5}{x + 2}\right)\left[\frac{x + 2}{x^2 - 4x - 5}\right]$.

B) $\frac{2(x - 2)}{x^2 - 4x - 5} - \frac{1}{x + 2}$.

C) $\frac{x + 2}{x^2 - 4x - 5}$.

D) $e^{\left[\ln(x^2-4x-5) - \ln(x+2)\right]}$.

E) $\frac{x^2 - 4x - 5}{x + 2}\left[\frac{2(x - 2)}{x^2 - 4x - 5} - \frac{1}{x + 2}\right]$.

11) If $y = (\ln 2)^2$, then $\frac{dy}{dx} =$ 11) _____

A) $2e^{\ln 2}$. B) $e^{\ln 2}$. C) $2 \ln 2$. D) 0. E) $\frac{1}{(\ln 2)^2}$.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

12) Find $\frac{dy}{dx}$ where $y = \log_2(x^2 + 3x + 1)$. 12) _____

13) If $y = \frac{\ln x}{\ln x^2}$, then find y'. 13) _____

14) If $y = \frac{x^2 + 1}{x + \ln x}$, then find y'. 14) _____

15) 15) _____

If $y = \ln\left(\frac{\sqrt{x^3 + 3x - 1}}{\sqrt{x^2 + 2x - 1}}\right)$, then find $\frac{dy}{dx}$.

16) At a soccer game concession stand, the profit P from selling x number of T-shirts (in hundreds) is given by $P = 7x - 3x \ln x$. Find $\frac{dP}{dx}$. 16) _____

17) The total revenue from the sales of a certain product are given by $R(x) = \frac{3000x}{\ln(5x + 20)}$. Find the marginal revenue. 17) _____

18) The total revenue from the sales of a certain product are given by $R(x) = \frac{2000x}{\ln(3x + 10)}$. Find the marginal revenue. 18) _____

19) The total revenue from the sales of a certain product are given by $R(x) = \frac{400x}{\ln(2x + 7)}$. Find the marginal revenue. 19) _____

20) The total revenue from the sales of a certain product are given by $R(x) = \frac{2255x}{\ln(7x + 50)}$. Find the marginal revenue. 20) _____

21) Find y' if $y = -3e^{4x^2 - 5x + 3}$. 21) _____

22) Find y' if $y = 4^{2x + 1}$. 22) _____

23) Find y' if $y = 10^{x^2 + 1}$. 23) _____

24) Find y' if $y = e^{\ln x^2}$. 24) _____

25) Find y' if $y = x^2e^{3x}$. 25) _____

26) Find y' if $y = \frac{xe^x}{x + 1}$. 26) _____

27) Suppose the demand equation for the manufacturer's product is $p = 100e^{-0.04q}$, where p is the price per unit for q units. Find the marginal revenue function. 27) _____

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

28) If $f(x) = \frac{x^2 + 1}{e^{3x}}$, then $f'(x) =$ 28) _____

A) $\frac{2x - x^2 - 1}{e^{6x}}$.

B) $\frac{2x - 3x^2 - 3}{e^{3x}}$.

C) $\frac{2x - 3x^2 - 3}{e^{6x}}$.

D) $\frac{2x}{e^{3x+2}}$.

E) $\frac{2x - x^2 - 1}{e^{3x}}$.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

29) If $y = e^{\sqrt{2}}$, then find y'. 29) _____

30) If $y = x^3 + 3^x$, then find y'. 30) _____

31) Suppose a population is growing according to the equation $P = 100e^t$. Find the rate of growth of the population, $\frac{dP}{dt}$. 31) _____

32) Differentiate: $g(x) = e^{\sqrt{2x - 5}}$ 32) _____

33) Differentiate: $g(x) = 4xe^{5x - 7}$ 33) _____

1) $y = x + 2$

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

3) $\frac{4}{(\ln 2)(4x + 5)}$ or $\frac{4\log_2 e}{4x + 5}$

4) $\frac{2}{x} + \frac{3 \ln^2 x}{x}$

5) $\frac{1}{2}\left[\frac{1}{x - 1} - \frac{1}{x + 1}\right]$

6) $\frac{10x}{x^2 + 5} - \frac{16}{3 - 4x}$

7) $\frac{4x^3}{4x + 5} + 3x^2 \ln(4x + 5)$

8) $\frac{2}{(2x + 3)[\ln(2x + 3)]}$

9) E

10) B

11) D

12) $\frac{2x + 3}{(\ln 2)(x^2 + 3x + 1)}$

13) 0

14) $\frac{2x(x + \ln x) - (x^2 + 1)\left(1 + \frac{1}{x}\right)}{(x + \ln x)^2}$

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

16) $\frac{dP}{dx} = 4 - 3 \ln x$

17) $\frac{dR}{dx} = \frac{3000 \ln(5x + 20) - 3000x\left(\frac{1}{5x + 20}\right) \times 5}{[\ln(5x + 20)]^2}$

18) $\frac{dR}{dx} = \frac{2000 \ln(3x + 10) - 2000x\left(\frac{1}{3x + 10}\right) \times 3}{[\ln(3x + 10)]^2}$

19) $\frac{dR}{dx} = \frac{400 \ln(2x + 7) - 400x\left(\frac{1}{2x + 7}\right) \times 2}{[\ln(2x + 7)]^2}$

20) $\frac{dR}{dx} = \frac{2255 \ln(7x + 50) - 2255x\left(\frac{1}{7x + 50}\right) \times 7}{[\ln(7x + 50)]^2}$

21) $-3(8x - 5)e^{(4x^2 - 5x + 3)}$

22) $2(\ln 4)4^{2x + 1}$

23) $2x(\ln 10)\left(10^{x^2+1}\right)$

24) $2x$

25) $x(3x+2)e^{3x}$

26) $\dfrac{e^x(x^2+x+1)}{(x+1)^2}$

27) $100e^{-0.04q}(-0.04q)$

28) B

29) 0

30) $3x^2 + 3^x \ln 3$

31) $\dfrac{dP}{dt} = 100e^t$

32) $g'(x) = \dfrac{e^{\sqrt{2x-5}}}{\sqrt{2x-5}}$

33) $g'(x) = 20xe^{5x-7} + 4e^{5x-7}$