Exam 3

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

1) Differentiate: $\ln\left(\frac{x+2}{x-1}\right)$

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

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

C) $\frac{x-1}{x+2}$

D) $\frac{1}{x+2} - \frac{1}{x-1}$

E) none of the above

Find f′(x) for the following function.

2) $f(x) = e^{8x^2} + x$

A) $16xe + 1$ B) $16xe^{x^2} + 1$ C) $16xe^{2x} + 1$ D) $16xe^{8x^2} + 1$

3) $f(x) = \ln 9x^2$

A) $\frac{18}{x}$ B) $\frac{2}{x}$ C) $\frac{2x}{x^2 + 9}$ D) $\frac{1}{2x + 9}$

4) $f(x) = 2^{7x}$

A) $2^{7x}(2 \ln 7)$ B) $2^{7x}(14 \ln 7)$ C) $2^{7x}(14 \ln 2)$ D) $2^{7x}(7 \ln 2)$

5) $f(x) = \ln 8$

A) $\frac{1}{8}$ B) 0 C) 1 D) $-\frac{1}{8}$

6) $f(x) = (\ln x)^6$

A) $\frac{6(\ln x)^5}{x}$ B) $\frac{1}{(\ln x)^6}$ C) $\frac{1}{x^6}$ D) $6(\ln x)^5$

7) $f(x) = \log(3x - 4)$

A) $\frac{3x - 4}{3 \ln 10}$ B) $\frac{3}{\ln 10}$ C) $\frac{1}{(3x - 4) \ln 10}$ D) $\frac{3}{(3x - 4) \ln 10}$

8) $f(x) = x^6 \ln (3x)$

A) $6x^4$ B) $x^5\left[\frac{1}{3} + 6 \ln(3x)\right]$ C) $x^5[1 + 6 \ln(3x)]$ D) $18x^4$

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Find the antiderivative.

9) $\int (5x - 8)\,dx$

A) $5x^2 - 8x + C$ B) $\frac{5}{2}x^2 + C$ C) $\frac{5}{2}x^2 - 8x + C$ D) $5x + C$

10) $\int \frac{38}{x^2}\,dx$

A) $38x + C$ B) $\frac{38}{x} + C$ C) $-38x + C$ D) $-\frac{38}{x} + C$

Find f″ (x) for the following function.

11) $f(x) = 3\ln(9x - 1)$

A) $-\frac{243}{(9x - 1)^2}$ B) $\frac{243}{(9x - 1)^2}$ C) $-\frac{27}{9x - 1}$ D) $\frac{27}{9x - 1}$

12) $f(x) = e^{5x}$

A) $5e^{5x}$ B) e^{5x} C) $25e^{5x}$ D) $-25e^{5x}$

SHORT ANSWER. Show all work CLEARLY. Write your answer in the space provided. Unless otherwise instructed, give exact answers.

Differentiate.

13) $y = \ln[\ln(\ln 5x)]$ [*7 points*]

$\frac{dy}{dx} =$

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Find dy/dx by implicit differentiation.

14) $y^5e^x + x = y^4x$ [***13 points***]

$\frac{dy}{dx} =$

.....

Find the requested value of the second derivative of the function. Give the exact value.

15) $f(x) = 4e^{-x^2}$; **(a)** Find **(i)** $f'(4)$ & **(ii)** $f''(4)$.

(b) Determine whether the graph of f(x) is increasing, decreasing or turning at $x = 4$.

(c) Determine whether the graph of f(x) is concave up, concave down or neither at $x = 4$.

[***13 points***]

(a) (i) $f'(4) =$ ..... **(ii)** $f''(4) =$ .....

At $x = 4$, the graph of f(x) is

(b) (increasing/decreasing)..... and is

(c) (concavity) .....

Name_____

Find f′(x) and f″(x) for the following function. Simplify your answer.

16) $f(x) = x^{-5}e^{9x}$ [***15 points***]

f′(x) =

.....

f″(x) =

.....

Find the equation in slope–intercept form of the line tangent to the curve at the indicated point. Give exact numbers.

17) $x^2 + y^2 = 1$; (5, 9) [***9 points***]

Equation:

.....

Answer Key

1) D
2) D
3) B
4) D
5) B
6) A
7) D
8) C
9) C
10) D
11) A
12) C
13) $\frac{1}{x \ln 5x \ln (\ln 5x)}$
14) $\frac{dy}{dx} = \frac{y^4 - y^5 e^x - 1}{5y^4 e^x - 4xy^3}$
15) $248e^{-16}$
16) $e^{9x}(81x^{-5} - 90x^{-6} + 30x^{-7})$
17) $-\frac{5}{9}$