

Chapter 5 Test Review

Date _____ Period _____

Differentiate each function with respect to x .

1) $f(x) = \log_4 x^5$

A) $f'(x) = x^5$

B) $f'(x) = \frac{\ln 4}{5x^4}$

C) $f'(x) = \frac{5}{x \ln 4}$

D) $f'(x) = \frac{\ln 4}{x^5}$

2) $f(x) = 4^{x^5}$

A) $f'(x) = 4^{(x^5-1)\ln 4} \cdot 5x^4$

B) $f'(x) = 4^{x^5} \ln 4 \cdot 5x^4$

C) $f'(x) = 5x^4$

D) $f'(x) = 4^{x^5} \ln 4$

3) $y = \log_2 \left(\frac{5x^3}{x^2 - 2} \right)^5$

A) $\frac{dy}{dx} = 5 \left(\frac{\ln 2}{5x^3} - \frac{\ln 2}{x^2 - 2} \right)$

B) $\frac{dy}{dx} = 5 \left(\frac{\ln 2}{15x^2} - \frac{\ln 2}{2x} \right)$

C) $\frac{dy}{dx} = 5(5x^3 - (x^2 - 2))$

D) $\frac{dy}{dx} = 5 \left(\frac{1}{5x^3 \ln 2} \cdot 15x^2 - \frac{1}{(x^2 - 2) \ln 2} \cdot 2x \right)$

4) $f(x) = \ln 4x^3$

A) $f'(x) = \frac{1}{12x^2}$

B) $f'(x) = 4x^3$

C) $f'(x) = \frac{1}{4x^3} \cdot 12x^2$

D) $f'(x) = \frac{1}{4x^3}$

5) $f(x) = e^{2x^3}$

A) $f'(x) = 6x^2$

B) $f'(x) = e^{2x^3}$

C) $f'(x) = 6x^2 e^{2x^3 - 1}$

D) $f'(x) = 6x^2 e^{2x^3}$

6) $y = \ln \sqrt[5]{\frac{5x^4}{5x^5 + 2}}$

A) $\frac{dy}{dx} = \frac{1}{5} \left(\frac{1}{20x^3} - \frac{1}{25x^4} \right)$

B) $\frac{dy}{dx} = \frac{1}{5} \left(\frac{1}{5x^4} \cdot 20x^3 - \frac{1}{5x^5 + 2} \cdot 25x^4 \right)$

C) $\frac{dy}{dx} = \frac{1}{5} (5x^4 - (5x^5 + 2))$

D) $\frac{dy}{dx} = \frac{1}{5} \left(\frac{1}{5x^4} - \frac{1}{5x^5 + 2} \right)$

Use logarithmic differentiation to differentiate each function with respect to x .

7) $y = 2x^{5x}$

A) $\frac{dy}{dx} = y(25 \ln x + 25)$

B) $\frac{dy}{dx} = y(10 \ln x + 10)$

C) $\frac{dy}{dx} = y(15 \ln x + 15)$

D) $\frac{dy}{dx} = y(5 \ln x + 5)$

For each problem, find the derivative of the function at the given value.

9) $f(x) = -e^{-x-2}$ at $x = -3$

A) $f'(-3) = \frac{1}{e}$

B) $f'(-3) = e$

C) $f'(-3) = \frac{1}{e^2}$

D) $f'(-3) = e^2$

Evaluate each definite integral.

11) $\int_{-4}^{-2} 3e^{2x+4} dx$

A) $\frac{3e^4 - 3}{2e^4} \approx 1.473$

B) $\frac{10e^4 - 3}{2e^4} \approx 4.973$

C) $\frac{-3e^4 - 9}{2e^4} \approx -1.582$

D) $\frac{-e^4 + 1}{e^4} \approx -0.982$

13) $\int_{-5}^{-2} \frac{4}{x+1} dx$

A) $-10 \ln 4 \approx -13.863$

B) $6 \ln 4 \approx 8.318$

C) $-4 \ln 11 \approx -9.592$

D) $-4 \ln 4 \approx -5.545$

For each problem, use implicit differentiation to find y' in terms of x and y .

8) $5x^2 + 3x + 2 = e^{5y^2}$

A) $y' = \frac{-10x - 3}{e^{5y^2}}$

B) $y' = \frac{10ye^{5y^2}}{10x + 3}$

C) $y' = \frac{5x^2 + 3x + 2}{e^{5y^2}}$

D) None of these

For each problem, find the slope of the function at the given value.

10) $f(x) = \ln(-x + 1)$ at $x = 0$

A) $-\frac{1}{3}$

B) 2

C) $-\frac{1}{4}$

D) -1

For each problem, find the average value of the function over the given interval.

14) $f(x) = 3e^x$; $[-2, 0]$

A) $\frac{3e^2 - 3}{2e^2} \approx 1.297$

B) $\frac{3e^2 - 3}{7e^2} \approx 0.371$

C) $\frac{6e^2 + 3}{e^2} \approx 6.406$

D) $\frac{3e^2 + 1}{e^2} \approx 3.135$

Evaluate each indefinite integral.

16) $\int -\frac{1}{x} dx$

A) $-e^x + C$

B) $-\ln |x| + C$

C) $\ln |x| + C$

D) $-\frac{2^x}{\ln 2} + C$

18) $\int -5^x dx$

A) $-\ln |x| + C$

B) $-\frac{5^x}{\ln 5} + C$

C) $-e^x + C$

D) $5^x + C$

20) $\int -\frac{\cos x}{\sin x} dx$

A) $-\cot x + C$

B) None of these

C) $-\cos x + C$

D) $-\ln |\sin x| + C$

For each problem, find $F'(x)$.

15) $F(x) = \int_{-4}^{3x} e^{t+3} dt$

A) $F'(x) = 3e^{3x+3}$

B) $F'(x) = 6e^{3x-2}$

C) $F'(x) = 6e^{3x+3}$

D) $F'(x) = 9e^{3x-2}$

17) $\int -e^x dx$

A) $-e^x + C$

B) $-\ln |x| + C$

C) $\ln |x| + C$

D) $-\frac{3^x}{\ln 3} + C$

19) $\int -3\cot x dx$

A) $-3\cos x + C$

B) $-3 \ln |\sec x + \tan x| + C$

C) $-3\cot x + C$

D) $-3 \ln |\sin x| + C$

21) $\int (e^{4x} + 4)^4 \cdot 4e^{4x} dx$

A) $\frac{4}{5}(e^{4x} + 4)^5 + C$

B) $\frac{1}{5}(e^{4x} + 4)^5 + C$

C) $(e^{4x} + 4)^5 + C$

D) $\frac{2}{5}(e^{4x} + 4)^5 + C$

$$22) \int \frac{(-2 + \ln -3x)^4}{x} dx$$

- A) $\frac{2}{3}(-2 + \ln -3x)^6 + C$
 B) $\frac{5}{4}(-2 + \ln -3x)^4 + C$
 C) $\frac{1}{5}(-2 + \ln -3x)^5 + C$
 D) $\frac{1}{3}(-2 + \ln -3x)^6 + C$

$$24) \int -\frac{20x^4}{2x^5 + 3} dx$$

- A) $-2 \ln |2x^5 + 3| + C$
 B) $-2e^{2x^5 + 3} + C$
 C) $4^{2x^5 + 3} + C$
 D) $-\frac{2 \cdot 4^{2x^5 + 3}}{\ln 4} + C$

$$26) \int -\frac{4e^{4 + \ln 3x}}{x} dx$$

- A) $-4e^{4 + \ln 3x} + C$
 B) $\ln |4 + \ln 3x| + C$
 C) $5^{4 + \ln 3x} + C$
 D) $e^{4 + \ln 3x} + C$

For each problem, find the particular solution of the differential equation that satisfies the initial condition.

$$28) f'(x) = -\frac{2}{x}, f(2) = -2 \ln 2 + 1$$

- A) $f(x) = 2 \ln -x + 1, x < 0$
 B) $f(x) = -2 \ln x + 1, x > 0$
 C) $f(x) = -\ln -x - 3, x < 0$
 D) $f(x) = 3 \ln -x - 2, x < 0$

$$23) \int 12e^{4x} \cdot (e^{4x} - 2)^3 dx$$

- A) $\frac{1}{3}(e^{4x} - 2)^6 + C$
 B) $\frac{5}{6}(e^{4x} - 2)^6 + C$
 C) $(e^{4x} - 2)^4 + C$
 D) $\frac{3}{4}(e^{4x} - 2)^4 + C$

$$25) \int \frac{25 \cos 5x}{\sin 5x} dx$$

- A) $5e^{\sin 5x} + C$
 B) $5 \ln |\sin 5x| + C$
 C) $\frac{5 \cdot 3^{\sin 5x}}{\ln 3} + C$
 D) $\ln |\sin 5x| + C$

$$27) \int 18x^2 \csc(2x^3 - 3) dx$$

- A) $3 \ln |\sec(2x^3 - 3) + \tan(2x^3 - 3)| + C$
 B) $3 \cot(2x^3 - 3) + C$
 C) $3 \ln |\csc(2x^3 - 3) - \cot(2x^3 - 3)| + C$
 D) $3 \sin(2x^3 - 3) + C$

Use logarithmic differentiation to differentiate each function with respect to x.

$$29) y = \frac{\sqrt[3]{5x^2 + 1}}{(4x^4 + 5)^2}$$

- A) $\frac{dy}{dx} = y \left(\frac{40x}{15x^2 + 3} + \frac{32x^3}{4x^4 + 5} \right)$
 B) $\frac{dy}{dx} = y \left(\frac{10x}{5x^2 + 1} + \frac{32x^3}{4x^4 + 5} \right)$
 C) None of these
 D) $\frac{dy}{dx} = y \left(\frac{40x}{15x^2 + 3} + \frac{160x^3}{4x^4 + 5} \right)$

Answers to Chapter 5 Test Review (ID: 1)

1) C
5) D
9) B
13) D
17) A
21) B
25) B
29) C

2) B
6) B
10) D
14) A
18) B
22) C
26) A

3) D
7) D
11) A
15) A
19) D
23) D
27) C

4) C
8) D
12) B
16) B
20) D
24) A
28) B