MAC 2233 Chapter 4 Review for the test

Multiple Choice
Identify the choice that best completes the statement or answers the question.

1. Find the derivative of the function.

\[ g(x) = 5x^{-3} + 6x^{-6} \]

a. \( g'(x) = 5x^{-3} + 6x^{-6} \)
b. \( g'(x) = -15x^{-3} - 36x^{-6} \)
c. \( g'(x) = 15x^{-4} + 36x^{-7} \)
d. \( g'(x) = -5x^{-4} - 6x^{-7} \)
e. \( g'(x) = -15x^{-4} - 36x^{-7} \)

2. Find the derivative of the function.

\[ r(x) = \frac{2x}{7} - \frac{x^{0.3}}{2} + \frac{4}{7x^{1.3}} - 4 \]

a. \( r'(x) = \frac{2}{7} - \frac{0.3}{2x^{0.3}} - \frac{5.2}{7x^{1.3}} \)
b. \( r'(x) = \frac{2}{7} - \frac{0.3x^{0.7}}{2} + \frac{5.2x^{2.3}}{7} \)
c. \( r'(x) = \frac{2}{7} - \frac{0.3x^{1.3}}{2x^{0.3}} - \frac{5.2}{7x^{0.3}} \)
d. \( r'(x) = \frac{2}{7} - \frac{0.3}{2x^{0.7}} + \frac{5.2}{7x^{2.3}} \)
e. \( r'(x) = \frac{2}{7} - \frac{0.3}{2x^{0.7}} - \frac{5.2}{7x^{2.3}} \)
3. Find the derivative of the function.

\[ s(x) = 2\sqrt{x} + \frac{39}{\sqrt{x}} \]

\[ s'(x) = 2 \cdot \frac{1}{2} \cdot x^{-\frac{1}{2}} - 39 \cdot \frac{1}{2} \cdot x^{-\frac{3}{2}} \]

\[ s'(x) = x^{-\frac{1}{2}} - \frac{3}{\sqrt[3]{x}} \cdot x^{-\frac{3}{2}} \]

\[ s'(x) = \frac{1}{\sqrt{x}} - \frac{3}{\sqrt[3]{x^3}} \]

\[ s'(x) = \frac{1}{\sqrt{x}} - \frac{3 \cdot 19.5}{x^\frac{3}{2}} \]

4. Find the slope of the tangent to the graph of the given function \( f(x) = 2x^3 \) at the point (-3, -54).

\[ f'(-3) = 6(-3)^2 = 54 = m_{\text{tan}} \]

5. Find the slope of the tangent to the graph of the given function at the indicated point.

\[ g(t) = \frac{7}{t^3}, (0.5, 56) \]

\[ g'(0.5) = -336 \]

\[ g'(0.5) = -\frac{21}{(0.5)^4} = -336 \]

6. Find all the values of \( x \) (if any) where the tangent line to the graph of the given equation is horizontal.

\[ y = 4x^2 + 13x + 13 \]

\[ y' = 8x + 13 = 0 \]

\[ 8x = -13 \]

\[ x = -\frac{13}{8} = -1.63 \]
7. Find the derivative of the function.

\[ h(x) = x(10 + 7x) = 10x + 7x^2 \]

a. 17x 

b. 10 + 14x 

c. 14 + x 

d. 7 

e. 10x 

\[ h'(x) = 10 + 14x \]

8. Calculate \( \frac{dy}{dx} \). You need not expand your answer.

\[ y = (10x^2 + x)(x - x^2) \]

a. \((20x + 1)(1 - x) + (x - x^2)(10x^2 + x)\) 

b. \(-40x^2 + 22x + 1\) 

c. \((20x + 1)(x - x^2) + (1 - 2x)(10x^2 + x)\) 

d. \((20x + 1)(x - x^2) - (1 - 2x)(10x^2 - x)\) 

e. \((20x + 1)(1 - x) + (x - x^2)(10x^2 + x)\) 

9. Calculate \( \frac{dy}{dx} \). You need not expand your answer.

\[ y = \left( \frac{x}{3.6} + \frac{3.6}{x} \right)(x^2 + 4) = \left( \frac{1}{3.6}x + \frac{3.6}{x} \right) \cdot (x^2 + 4) \]

a. \(2x\) 

b. \(2x \left( \frac{1}{3.6} - \frac{3.6}{x^2} \right) + \left( \frac{x}{3.6} + \frac{3.6}{x} \right)(x^2 + 4)\) 

c. \(2x \left( \frac{1}{3.6} - \frac{3.6}{x^2} \right)\) 

d. \(\left( \frac{1}{3.6} - \frac{3.6}{x^2} \right)(x^2 + 4) + 2x \left( \frac{x}{3.6} + \frac{3.6}{x} \right)\) 

e. \(\left( \frac{1}{3.6} - \frac{3.6}{x^2} \right)(x^2 + 4) - 2x \left( \frac{x}{3.6} + \frac{3.6}{x} \right)\) 

\[ \frac{dy}{dx} = \frac{1}{3.6}x + 3.6x^{-1} \]

\[ g = x^2 + 4 \]

\[ f' = \frac{1}{3.6} - 3.6x^{-2} \quad g' = 2x \]

\[ f' = \frac{1}{3.6} - \frac{3.6}{x^2} \]
10. Calculate \( \frac{dy}{dx} \).

\[
y = x^2(2x + 3)(5x + 5)
\]

a. \( 25x^2 + (2x + 3)(5x + 5) \)

b. \( 40x^3 + 75x^2 + 30x \)

c. \( 65x^2 + (2x + 75)(5x + 5) \)

d. \( 2x^3 + 75x^2 + 30x \)

e. \( 2x^2 + 75x + 30 \)

11. Calculate \( \frac{dy}{dx} \).

\[
y = (\sqrt{x} + 4)\left(\sqrt{x} + \frac{4}{x^2}\right)
\]

a. \( \frac{1}{\sqrt{x}} \left( \frac{\sqrt{x} + 4}{x^2} \right) + \left( \frac{1}{\sqrt{x}} - \frac{8}{x} \right)(\sqrt{x} + 4) \)

b. \( \frac{1}{2\sqrt{x}} \left( \frac{\sqrt{x} + 4}{x^2} \right) + \left( \frac{1}{2\sqrt{x}} + \frac{8}{3x^3} \right)(\sqrt{x} + 4) \)

c. \( \frac{1}{2\sqrt{x}} \left( \frac{\sqrt{x} + 4}{x^2} \right) + \left( \frac{1}{2\sqrt{x}} - \frac{8}{3x^3} \right)(\sqrt{x} + 4) \)

d. \( \frac{\sqrt{x}}{2} \left( \frac{\sqrt{x} + 4}{x^2} \right) + \left( \frac{\sqrt{x}}{2} - \frac{8}{3x^3} \right)(\sqrt{x} + 4) \)

e. \( \frac{1}{2\sqrt{x}} \left( \frac{\sqrt{x} + 4}{x^2} \right) + \left( \frac{1}{2\sqrt{x}} - 8\right)(\sqrt{x} + 4) \)

\[
f = \sqrt{x} \quad + 4
\]

\[
g = \sqrt{x} + \frac{4}{x^2}
\]

\[
= \sqrt{x} + 4
\]

\[
f' = \frac{1}{2}x^{\frac{1}{2}} + 0
\]

\[
g' = \frac{1}{2}x^{\frac{1}{2}} - 8x^{-3}
\]

\[
f'g + g'f
\]

\[
= \left( \frac{1}{2}x^{-\frac{1}{2}} \right) \left( \sqrt{x} + 4x^{-2} \right) + \left( \sqrt{x} + 4 \right) \left( \frac{1}{2}x^{-\frac{1}{2}} - 8x^{-3} \right)
\]

\[
= \left( \frac{1}{2} \cdot \frac{1}{\sqrt{x}} \right) \left( \sqrt{x} + \frac{4}{x^2} \right) + (\sqrt{x} + 4) \left( \frac{1}{2\sqrt{x}} - \frac{8}{x^3} \right)
\]

\[
multiply \ first
\]

\[
y = x^2(10x^2 + 10x + 15x + 15)
\]

\[
= x^2(10x^2 + 25x + 15)
\]

\[
y = 10x^4 + 25x^3 + 15x^2
\]

\[
y' = 10(4)x^{4-1} + 25(3)x^{3-1} + 15(2)x^{2-1}
\]

\[
y' = 40x^3 + 75x^2 + 30x
\]

product rule
12. Calculate \( \frac{dy}{dx} \). You need not expand your answer.

\[
y = \frac{5x + 5}{4x - 1}
\]

\[
a. \quad \frac{5(4x - 1) + 4(5x + 5)}{(4x - 1)^2} \\
b. \quad \frac{5(4x - 1) - 4(5x + 5)}{(4x - 1)^2} \\
c. \quad \frac{5(4x - 1) + 4(5x + 5)}{4x - 1} \\
d. \quad 5(4x - 1) - 4(5x + 5) \\
e. \quad 1.25
\]

\[
\text{Quotient Rule} \\
f = 5x + 5 \quad g = 4x - 1 \\
f' = 5 \quad g' = 4 \\
\]

\[
\frac{f'g - g'f}{g^2} = \frac{5(4x - 1) - 4(5x + 5)}{(4x - 1)^2}
\]

13. Calculate \( \frac{dy}{dx} \). You need not expand your answer.

\[
y = \frac{2x - 3}{(x - 5)(x - 1)(x - 4)}
\]

\[
a. \quad \frac{2(x - 5)(x - 1)(x - 4) + (3x^2 - 20x + 10)(2x - 3)}{(x - 5)(x - 1)(x - 4))^2} \\
b. \quad \frac{2}{3x^2 - 20x + 10} \\
c. \quad \frac{2(x - 5)(x - 1)(x - 4) - (3x^2 - 20x + 10)(2x - 3)}{(x - 5)(x - 1)(x - 4)^2} \\
d. \quad \frac{2(x - 5)(x - 1)(x - 4) - (3x^2 - 20x + 29)(2x - 3)}{(x - 5)(x - 1)(x - 4)^2} \\
e. \quad \frac{2(x - 5)(x - 4) - (3x^2 - 20x + 29)}{(x - 5)(x - 4)^2}
\]

\[
f = 2x - 3 \quad g = (x - 5)(x - 1)(x - 4) \\
f' = 2 \quad g' = (1)(x - 1)(x - 4) + (x - 5)(x - 1)(x - 4) + (x - 5)(x - 1)(1) \\
\]

\[
y' = \frac{2(x - 5)(x - 1)(x - 4) - (2x - 3)[(x - 1)(x - 4) + (x - 5)(x - 4) + (x - 5)(x - 1)]}{(x - 5)(x - 1)(x - 4)^2}
\]
14. Compute the derivative.

\[
\frac{d}{dx} \left[(x^3 + 3x)(x^2 - x)\right]_{x=2} = \frac{d}{dx} (x^5 - x^4 + 3x^3 - 3x^2)
\]

a. 92
b. 36
c. 59
d. 72
e. 78

15. Calculate the derivative of the function.

\[g(x) = (2x^2 + 2x + 3)^{-3}\]

\[g'(x) = -3(4x^2 + 2x + 3)^{-4}\]

a. \(-3(4x^2 + 2x + 3)^{-4}\)
b. \((-6x^2 + 6x + 9)^{-4}\)
c. \(-3(4x^2 + 2x + 3)\)
d. \(-3(2x^2 + 2x + 3)^{-4}\)
e. \(-12(2x^2 + 2x + 3)^{-4}\)

16. Calculate the derivative of the function.

\[s(x) = \left(\frac{6x + 7}{5x - 2}\right)^5\]

a. \(s'(x) = \left(\frac{6x + 7}{5x - 2}\right)^4 \frac{47}{(5x - 2)^2}\)
b. \(s'(x) = -5 \left(\frac{6x + 7}{5x - 2}\right)^4 \frac{12}{(5x - 2)^2}\)
c. \(s'(x) = -5 \left(\frac{6x + 7}{5x - 2}\right)^4 \frac{47x}{(5x - 2)^2}\)
d. \(s'(x) = 5 \left(\frac{6x + 7}{5x - 2}\right)^4 \frac{47}{(5x - 2)^2}\)
e. \(s'(x) = -5 \left(\frac{6x + 7}{5x - 2}\right)^4 \frac{47}{(5x - 2)^2}\)

\[s'(x) = 30(\frac{6x + 7}{5x - 2})^4 (5x - 2)^{-5} - 30(5x - 2)^{-6} (6x + 7)^5\]

\[= -5(\frac{6x + 7}{5x - 2})^4 (5x - 2)^{-6} \left[ -6(5x - 2) + 5(6x + 7) \right] \]

\[= -5 \left(\frac{6x + 7}{5x - 2}\right)^4 47\]
17. Find the indicated derivative. The independent variable is a function of $t$.

$$y = x^{0.5} (1 + x); \quad \frac{dy}{dt} = ?$$

$$y = x^{0.5} + x^{1.5}$$

a. $$\frac{dy}{dt} = (1.5x^{0.5}) \frac{dx}{dt}$$

b. $$\frac{dy}{dt} = (0.5x^{-0.5}) \frac{dx}{dt}$$

c. $$\frac{dy}{dt} = (0.5x^{-0.5} + 2.5x^{0.5}) \frac{dx}{dt}$$

d. $$\frac{dy}{dt} = (0.5x^{-0.5} + 1.5x^{0.5}) \frac{dx}{dt}$$

e. $$\frac{dy}{dt} = (0.5x^{0.5} + 2.5x^{0.5}) \frac{dx}{dt}$$

18. Find the indicated derivative.

$$y = 8x^3 + \frac{11}{x}, x = 5 \text{ when } t = 1; \quad \frac{dx}{dt} \bigg|_{t=1} = 11; \quad \frac{dy}{dt} \bigg|_{t=1} = ?$$

Please round the answer to the nearest hundredth.

a. $$\frac{dy}{dt} \bigg|_{t=1} = 2175.80$$

b. $$\frac{dy}{dt} \bigg|_{t=1} = 599.56$$

c. $$\frac{dy}{dt} \bigg|_{t=1} = 1315.16$$

d. $$\frac{dy}{dt} \bigg|_{t=1} = 6595.16$$

e. $$\frac{dy}{dt} \bigg|_{t=1} = 13151.60$$
19. Find the derivative of the following function:

\[ f(x) = \ln(5x - 9) \]

\[
\begin{align*}
\text{a. } & \frac{1}{5x - 9} \\
\text{b. } & \frac{5}{5x - 9} \\
\text{c. } & \frac{5}{5x - 9} \\
\text{d. } & \frac{45}{5x - 9} \\
\text{e. none of these}
\end{align*}
\]

\[
\begin{align*}
f(x) &= \ln(5x - 9) \\
f'(x) &= \frac{1}{5x - 9} \cdot \frac{d}{dx}(5x - 9) \\
&= \frac{5}{5x - 9} \\
\end{align*}
\]

20. Find the derivative of the following function:

\[ f(x) = \log_{74} x \]

\[
\begin{align*}
\text{a. } & \frac{1}{4x \ln(7)} \\
\text{b. } & \frac{7}{x \ln(4)} \\
\text{c. } & \frac{1}{x \ln(7)} \\
\text{d. } & \frac{4}{x \ln(7)} \\
\text{e. none of these}
\end{align*}
\]

\[
\begin{align*}
f(x) &= \log_{74} x \\
f'(x) &= \frac{1}{x \ln(7)} \\
&= \frac{1}{x \ln(7)} \\
\end{align*}
\]

21. Find the derivative of the function.

\[ f(x) = (x^9 + 8) \ln x \]

\[
\begin{align*}
\text{a. } & \frac{x^9 (9 + 9 \ln x) + 8}{x} \\
\text{b. } & \frac{x^8 (1 + 9 \ln x) + 8}{x} \\
\text{c. } & \frac{x^9 (1 + 9 \ln x) + 8}{x} \\
\text{d. } & \frac{x^9 (1 + \ln x) + 8}{x} \\
\text{e. none of these}
\end{align*}
\]

\[
\begin{align*}
f &= x^9 + 8 \\
g &= \ln x \\
g' &= \frac{1}{x} \\
f' &= 9x^8 \\
g' &= \frac{1}{x} \\
f' &= 9x^8 (\ln x) + \frac{1}{x} (x^9 + 8) \\
&= 9x^8 \ln x + x^8 + \frac{8}{x} \\
&= \frac{9x^9 \ln x + x^9 + 8}{x} \\
&= \frac{x^9 (\ln x + 1) + 8}{x}
\end{align*}
\]
22. Find the derivative of the function.

\[ h(x) = \ln \left[ (-2x + 2)(7x + 5) \right] = \ln (-2x+2) + \ln (7x+5) \]

\[ h'(x) = \frac{1}{-2x+2} \cdot (-2) + \frac{1}{7x+5} \cdot 7 \]

\[ = \frac{-2}{-2x+2} + \frac{7}{7x+5} \]

a. \[ \frac{7}{-2x+2} + \frac{2}{7x+5} \]

b. \[ \frac{7}{-2x+2} - \frac{2}{7x+5} \]

c. \[ \frac{-2}{-2x+2} + \frac{7}{7x+5} \]

d. \[ \frac{1}{-2x+2} + \frac{1}{7x+5} \]

e. \[ \frac{1}{-2x+2} - \frac{1}{7x+5} \]

23. Find the derivative of the function.

\[ f(x) = \ln \left| \frac{(5x+3)^6}{(4x+2)^9(8x+9)} \right| = \ln (5x+3)^6 - \ln (4x+2)^9 - \ln (8x+9) \]

\[ = 6 \ln (5x+3) - 9 \ln (4x+2) - \ln (8x+9) \]

\[ f'(x) = 6 \cdot \frac{1}{5x+3} - 9 \cdot \frac{1}{4x+2} - \frac{1}{8x+9} \]

\[ = \frac{30}{5x+3} - \frac{36}{4x+2} - \frac{8}{8x+9} \]
24. Find the derivative of the function.

\[ r(x) = [\ln(x^7)]^4 = [7 \cdot \ln(x)]^4 \]

\[ r'(x) = 4 \cdot [7 \ln(x)]^3 \cdot \frac{d}{dx}(7\ln(x)) \]

rewrite as \( \frac{7}{x} \) again

\[ = \frac{28[\ln(x^7)]^3}{x} \]

a. \( \frac{28[\ln(x^6)]^3}{x^7} \)

b. \( \frac{28[\ln(x^7)]^3}{x^7} \)

c. \( \frac{28[\ln(x^7)]^3}{x} \)

d. \( \frac{28[\ln(x^7)]^4}{x^7} \)

e. none of these

25. Find the derivative of the function.

\[ f(x) = e^{5x^7 \ln 4x} \]

\[ f' = e^{5x^7} \cdot 35x^6 \cdot \ln(4x) \]

\[ g = \ln(4x) \]

\[ g' = \frac{1}{4x} \cdot 4 = \frac{1}{x} \]

\[ = \frac{35 \cdot e^{5x^7} \cdot 6x \ln(4x) + e^{5x^7}}{x} \]

\[ = \frac{35e^{5x^7} \cdot 6 \ln(4x) + e^{5x^7}}{x} \]

a. \( 35e^{5x^7} \cdot x^6 \ln(4x) + \frac{e^{5x^7}}{x} \)

b. \( 35e^{5x^7} \cdot x^6 \ln(4x) + \frac{e^{5x^7}}{4} \)

c. \( 35e^{5x^7} \cdot x^6 \ln(4x) + \frac{e^{5x^7}}{x} \)

d. \( 35e^{5x^7} \cdot x^6 \ln(4x) + \frac{4e^{5x^7}}{x} \)

e. \( 7e^{5x^7} \cdot x^6 \ln(4x) + \frac{4e^{5x^7}}{x} \)
26. Find the derivative of the function.

\[ h(x) = e^{5x^2 - 2x + \frac{1}{x}} \]

a. \( \frac{10x^2 - 2x - 1}{x} e^{\frac{5x^2 - 2x + \frac{1}{x}}{x}} \)

b. \( \frac{10x^3 - 2x^2 - 1}{x^2} e^{\frac{5x^2 - 2x + \frac{1}{x}}{x}} \)

c. \( \frac{5x^3 - 4x^2 - 1}{x} e^{\frac{5x^2 - 2x + \frac{1}{x}}{x}} \)

d. \( \frac{5x^3 - 4x^2 - 1}{x^2} e^{\frac{5x^2 - 2x + \frac{1}{x}}{x}} \)

e. none of these

27. Find the derivative of the function.

\[ e^{-10x^{10x}} = \frac{e^{-10x}}{10x} \]

a. \( \frac{-20x + 1}{10x^2} e^{20x} \)

b. \( \frac{20x + 1}{x^2} e^{20x} \)

c. \( \frac{20x + 1}{10x^2} e^{20x} \)

d. \( \frac{-20x + 1}{10x^2} e^{20x} \)

e. none of these

28. Find \( \frac{dy}{dx} \) using implicit differentiation.

\[ 3x + 4y = 10 \]

a. \( \frac{-4}{3} \)

b. \( \frac{-3}{4} \)

c. \( \frac{3}{4} \)

d. \( 0 \)

e. \( -4 \)
29. Find \( \frac{dy}{dx} \) using implicit differentiation.

\[ 7x + 5y = xy \]

\[
\begin{align*}
a. \quad & \frac{x-5}{7-y} \\
b. \quad & \frac{7-y}{x-5} \\
c. \quad & 5-y \\
d. \quad & x-7 \\
e. \quad & \frac{7-x}{y-5}
\end{align*}
\]

\[ 7y' + 5y' = y + xy' \]

\[ y' = \frac{y-7}{5-x} \]

30. Find \( \frac{dy}{dx} \) using implicit differentiation.

\[ y \ln x + y = 10 \]

\[
\begin{align*}
a. \quad & \frac{y}{x(\ln x + 1)} \\
b. \quad & \frac{x}{y(\ln y + 1)} \\
c. \quad & \frac{y}{x \ln x} \\
d. \quad & -\frac{1}{x(\ln x + 1)} \\
e. \quad & \frac{y}{x (\ln x + 1)}
\end{align*}
\]

\[ y \ln x + y = 10 \]

\[ y' \ln x + \frac{y}{x} + y' = 0 \]

\[ y' \ln x + y = -\frac{y}{x} \]

\[ y'(\ln x + 1) = -\frac{y}{x} \]

\[ y' = -\frac{y}{x(\ln x + 1)} \]
31. Find \( \frac{dy}{dx} \) using implicit differentiation.

\[
\frac{xy}{8} - y^2 = 5
\]

\( f = \frac{1}{8} \)
\( g = y \)
\( f' = \frac{1}{8} \)
\( g' = y \)

\[
\frac{1}{8} + \frac{1}{8} xy' - 2y \cdot y' = 0
\]

\[
\frac{1}{8} xy' - 2y \cdot y' = -\frac{1}{8} y
\]

\[
\frac{1}{8} \cdot 8 \cdot xy' - 16y \cdot y' = -y
\]

\[
y' (x - 16y) = -y
\]

\[
y' = \frac{-y}{x - 16y}
\]

\[
y' = \frac{-y}{16y - x}
\]

32. Find \( \frac{dx}{dy} \) using implicit differentiation.

\[
(xy)^2 + y^2 = 3
\]

\( f = y^2 \)
\( g = x^2 + 1 \)

\( f' = 2y \cdot y' \)
\( g' = 2x \)

\[
2y \cdot y' (x^2 + 1) + 2xy^2 = 0
\]

\[
2y' (x^2 + 1) = -2xy^2
\]

\[
y' = \frac{-2xy^2}{2y(x^2 + 1)}
\]

Answer is not among the choices!
33. Find \( \frac{dy}{dx} \) using implicit differentiation.

\[ xe^y - ye^x = 10 \]

a. \( \frac{y - 1}{x - 1} \)

b. \( \frac{xe^x + e^y}{ye^y + e^x} \)

c. \( \frac{xe^y - e^x}{ye^x - e^y} \)

d. \( \frac{ye^x - e^y}{xe^y - e^x} \)

e. \( \frac{ye^y + e^x}{xe^y - e^x} \)

34. Find \( \frac{dy}{dx} \) using implicit differentiation.

\[ \frac{e^x}{y^2} = 12 + e^y \]

a. \( \frac{y}{2 + y^3} \)

d. \( \frac{ye^x}{2e^x + y^3 e^y} \)

c. \( \frac{2e^x + y^3 e^y}{ye^x} \)

\( \frac{ye^x - 12e^x + 3y^2 e^y}{2ye^x} \)

e. \( \frac{e^x \cdot y - 2}{e^x + ye^y} \)

f. \( e^x \cdot y - 2 \)

g. \( g = y^{-2} \)

\( e^x \cdot y - 2 + e^x (-ay^{-3}) y' \)

\( e^x y^{-2} + e^x (-ay^{-3}) y' = 0 + e^y \cdot y' \)

\( e^x (-ay^{-3}) y' - e^y y' = -e^x y^{-2} \)

\[ y' (-\frac{2e^x - e^y}{y^2}) = -e^{x+1} \]

\( y' = e^x y \quad \frac{e^y}{2e^x + y^3 e^y} \)
35. Find \( \frac{dy}{dx} \) using implicit differentiation.
\[
\ln(20 + e^{xy}) = y
\]
\[
a. \quad x + y
\]
\[
b. \quad \frac{1}{20 + e^{xy}(1-x)}
\]
\[
c. \quad \frac{ye^{xy}}{20 + e^{xy}}
\]
\[
d. \quad \frac{y}{1-x}
\]
\[
e. \quad \frac{ye^{xy}}{20 + e^{xy}(1-x)}
\]

36. Use the shortcut rules to calculate the derivative of the given function.
\[
f(x) = 8x^{2.5}
\]
\[
a. \quad f(x) = 20x
\]
\[
b. \quad f(x) = 8x^{2.5}
\]
\[
c. \quad f(x) = 20x^{1.5}
\]
\[
d. \quad f(x) = 20x^{2.5}
\]
\[
e. \quad f(x) = 8x^{1.5}
\]

Short Answer

37. Find the derivative of the function.
\[
s(x) = 7\sqrt{x} + \frac{35}{\sqrt{x}}
\]

38. Find the derivative of the function.
\[
k(x) = \frac{6x^8 - 10x^9}{x^3}
\]

36. \( f(x) = 8x^{2.5} \)
\[
f'(x) = 8(2.5)x^{2.5-1} = 20x^{1.5} \)

\[
\lim_{x \to 8} \frac{x^2 - 16x + 64}{x^2 - 8x} = \lim_{x \to 8} \frac{x^2 - 16x + 64}{x^2 - 8x} = \lim_{x \to 8} \frac{2x - 16}{2x} = \frac{0}{16} = \boxed{0}
\]

Say whether L'Hospital's rule applies.

It is does, use it to evaluate the given limit. If not, use some other method.

40. Given.

\[
\lim_{x \to -2} \frac{x^2 + 14x + 24}{x^2 + 2x} = \lim_{x \to -2} \frac{2x + 14}{2x + 2} = \frac{2(-2) + 14}{2(-2) + 2} = \frac{10}{-2} = \boxed{-5}
\]

Say whether L'Hospital's rule applies.

It is does, use it to evaluate the given limit. If not, use some other method.

\[
S(x) = \frac{7\sqrt{x} + 35}{\sqrt{x}} = 7x^{\frac{1}{2}} + 35x^{-\frac{1}{2}}
\]

\[
S'(x) = 7 \left( \frac{1}{2} \right) x^{-\frac{1}{2}} + 35 \left( -\frac{1}{2} \right) x^{-\frac{3}{2}}
\]

\[
= \frac{7 \cdot \frac{1}{2}}{\frac{1}{x}} - 35 \cdot \frac{1}{2} \cdot \frac{1}{x^{\frac{3}{2}}}
\]

\[
K(x) = \frac{6x^8 - 10x^9}{x^3} = \frac{6x^8}{x^3} - \frac{10x^9}{x^3} = 6x^5 - 10x^6
\]

\[
K'(x) = 30x^4 - 60x^5
\]
MAC 2233 Chapter 4 Review for the test
Answer Section

MULTIPLE CHOICE

1. ANS: E    PTS: 1
2. ANS: E    PTS: 1
3. ANS: D    PTS: 1
4. ANS: A    PTS: 1
5. ANS: B    PTS: 1
6. ANS: D    PTS: 1
7. ANS: B    PTS: 1
8. ANS: C    PTS: 1
9. ANS: D    PTS: 1
10. ANS: B   PTS: 1
11. ANS: C   PTS: 1
12. ANS: B   PTS: 1
13. ANS: D   PTS: 1
14. ANS: D   PTS: 1
15. ANS: A   PTS: 1
16. ANS: E   PTS: 1
17. ANS: D   PTS: 1
18. ANS: D   PTS: 1
19. ANS: B   PTS: 1
20. ANS: C   PTS: 1
21. ANS: C   PTS: 1
22. ANS: C   PTS: 1
23. ANS: B   PTS: 1
24. ANS: C   PTS: 1
25. ANS: A   PTS: 1
26. ANS: B   PTS: 1
27. ANS: D   PTS: 1
28. ANS: C   PTS: 1
29. ANS: B   PTS: 1
30. ANS: A   PTS: 1
31. ANS: E   PTS: 1
32. ANS: B   PTS: 1
33. ANS: D   PTS: 1
34. ANS: B   PTS: 1
35. ANS: E   PTS: 1
36. ANS: C   PTS: 1
SHORT ANSWER

37. ANS:
\[
\frac{3.5}{\sqrt{x}} - \frac{17.5}{x^{1.5}}
\]

PTS: 1

38. ANS:
\[
30x^4 - 60x^5
\]

PTS: 1

39. ANS:
yes; 0

PTS: 1

40. ANS:
yes; -5

PTS: 1