

Math 160 - Exponential Functions - Finding Derivatives

Name _____

1) Differentiate: $f(x) = 4e^{3x}$

2) Differentiate: $f(x) = \frac{e^x + 1}{e^x - 1}$

3) Differentiate: $e^{2x} - x^2$

4) Differentiate: $f(x) = x^3 e^{-x^3}$

5) Differentiate: $f(x) = \frac{x}{e^x}$

6) Let $f(x) = \frac{e^t - e^{t/2}}{2}$. What is $f''(0)$?

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

B) $\frac{3}{8}$

C) $\frac{3}{16}$

D) $\frac{3}{4}$

E) none of the above

7) Let $y = e^{e^{2x} + 1}$. What is $\frac{dy}{dx}$?

A) ee^2

B) e^2

C) e^{2x+1}

D) $2e^{2x+1}$

E) none of the above

8) What is $\frac{d}{dx} \frac{1}{3} e^{3-2x}$?

A) $-\frac{1}{6} e^{3-2x}$

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

C) $\frac{1}{12} e^{4-2x}$

D) e^{-2x}

9) Differentiate: $(4e^{3x} - 1)^5$

10) Which of the following properties are true of the graph of $y = 10e^{2x}$?

- (I) It is concave up.
- (II) The y -intercept is $(0, 2)$.
- (III) It has a minimum at $x = 0$.
- (IV) y is positive for $x = 0$ and negative for $x < 0$.

A) (I) and (III) B) (III) and (IV) C) (I) D) (I) and (II)

11) Which of the following gives the best graphical interpretation of the fact $\frac{d}{dx}(e^x) = e^x$?

- A) The slope of the secant through the points (h, e^h) and $(0, 1)$ is e^x .
- B) The derivative as a function is the best approximation of the tangent line to $f(x)$.
- C) The function e^x is always positive.
- D) The slope of the curve $y = e^x$ at an arbitrary value of x is exactly equal to the function value at that point.
- E) The graph is approximately a straight line.

12) Differentiate: $e^{-x^2/4}$

13) Differentiate: $(x^3 + 1)e^{-4x}$

14) If $f'(x) = e^{-3x} - 1$, what is true of $f(x)$?

- (I) It is always decreasing.
- (II) It has a critical point.
- (III) It has an inflection point.
- (IV) It has an x -intercept.

A) (I) and (III)
B) (II) and (IV)
C) (II) and (III)
D) (I) only
E) none of the above

15) What is $\frac{d}{dx}(6e^{2x} - x)^3$?

- A) $3(6e^{2x} - x)^2(12e^{2x} - 1)$ B) $3(12e^x - 1)^2$
C) $3(6e^{2x} - x)^2(12e^{2x})$ D) $3(12xe^{2x} - 1 - 1)^2$

16) What is $\frac{d}{dx}(e^3)$?

- A) 0
B) $\frac{e^4}{4}$
C) $3e^2$
D) e^3
E) none of the above

17) Differentiate: $e^{3e^{2x}}$

18) If $f'(x) = e^{-x}$, what can you say about $f(x)$?

A) It is always concave up.

B) It is always decreasing.

C) It has an inflection point.

D) all of the above

19) Differentiate: $\frac{x}{1 + e^{-x}}$

20) Find and classify the extreme point(s) of $f(x) = -2e^x + 6x + 5$.

A) $(\ln 3, 6 \ln 3 - 1)$ relative maximum

B) $(0, 3)$ relative minimum

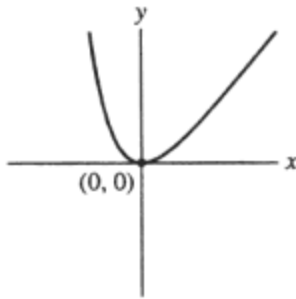
C) $(\ln 6, -7 + 6 \ln 6)$ relative maximum

D) $\left(\frac{1}{2} \ln 6, -1 + 3 \ln 6\right)$ relative maximum

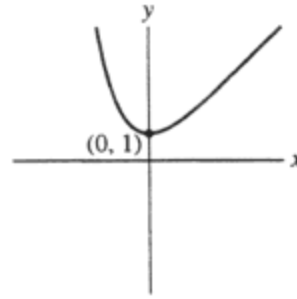
E) none of the above

21) Which of the following is the graph of $y = e^{-x} + x$?

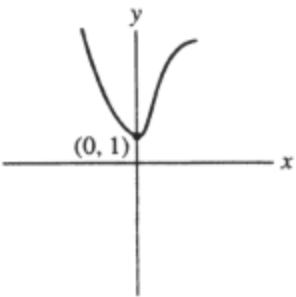
A)



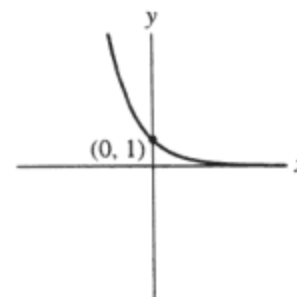
B)



C)



D)



22) Sketch the graph of $y = \frac{1}{2}e^{2x} - x$.

23) Sketch the graph of $y = -3e^{2x} + 1 - 3e$.

24) If $y = \frac{e^x - 1}{e^x + 1}$, then $\frac{dy}{dx}$ equals:

A) 1

B) $\frac{2e^x}{(e^x + 1)^2}$

C) 0

D) $\frac{e^x - e^x(e^x - 1)}{(e^x + 1)}$

Answer Key

Testname: SECTIONS4-1-3-DERIV

1) $f' = 12e^{3x}$

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

3) $2e^{2x} - 2x$

4) $f' = -3x^5 e^{-x^3} + 3x^2 e^{-x^3}$

5) $f' = \frac{1-x}{e^x}$

6) B

7) E

8) B

9) $5(4e^{3x} - 1)^4 \cdot 12e^{3x}$

10) C

11) D

12) $-\frac{x}{2}e^{x^2/4}$

13) $-4(x^3 + 1)e^{-4x} + 3x^2 e^{-4x}$

14) B

15) A

16) A

17) $6e^3 e^{2x} + 2x$

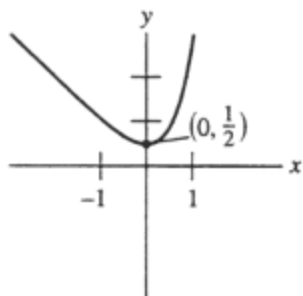
18) B

19) $\frac{1 + e^{-x} + xe^{-x}}{(1 + e^{-x})^2}$

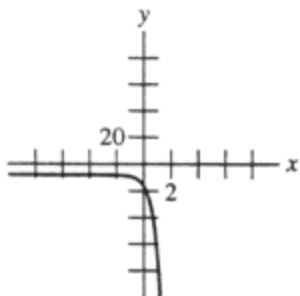
20) A

21) B

22)



23)



Answer Key

Testname: SECTIONS4-1-3-DERIV

24) B