PRACTICE TEST 3/105-A FALL 96

In problems 1 - 12, find the derivatives $\frac{dy}{dx}$ of the given functions.

1. $y = e^{2x}\ e^{x^3}$

   a. $2\ e^{2x}\ e^{x^3}$ b. $3\ e^{2x}\ e^{x^2}$ c. $2e^{2x} + 3\ e^{x^2}$

   d. $e^{2x + x^3}\ (2 + 3\ x^2)$ e. $e^{2x} + x^3$

2. $y = (x^2 + 1)\ e^{3x}$

   a. $2x\ e^{3x}$ b. $3\ (x^2 + 1)\ e^{3x}$ c. $2\ x\ e^{3x} + 3\ (x^2 + 1)\ e^{3x}$

   d. $x^2\ e^{2x} + e^{3x}$ e. $(x^2 + 1) + 3\ e^{3x}$

3. $y = \frac{x^2 + 1}{e^x}$

   a. $\frac{2x}{ex}$ b. $\frac{x^2 + 1}{e^{2x}}$ c. $\frac{2x + e^x}{e^{2x}}$

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

4. $y = (e^{2x} + 3x)^4$

   a. $4\ (e^{2x} + 3\ x)^3$ b. $(\ 2e^{2x} + 3\ )^4$ c. $4\ (e^{2x} + 3\ x)\ (2e^{2x} + 3)$

   d. $4\ (e^{2x} + 3x)^3\ (\ 2e^{2x} + 3\ )$ e. $4\ (e^{2x} + 3\ x)^3\ (\ e^{2x} + 3x\ )$

5. $y = \ln (x^2)\ e^x$

   a. $\frac{e^x}{x^2}$ b. $2\ x \ln (x^2)\ x^{e^x}$ c. $\frac{2}{x}\ e^x + \ln (x^2) e^x$

   d. $\ln (x^2)\ e^x$ e. x

6. $y = \ln e^x$

   a. x b. 1 c. $\frac{1}{e^x}$ d. e^x e. $\frac{e^x}{x}$

7. $y = \ln \left(\frac{x}{x+1}\right)$

a. $\frac{1}{(x+1)^2}$ b. $\frac{1}{x} - \frac{1}{x+1}$ c. $\frac{x+1}{x}$

d. $\frac{x}{x+1}$ e. $\ln x - \ln (x+1)$

8. $y = \ln[(2x-1)^3 (x^2+1)]$

a. $3 (2x+1)^2 (x^2+1)$ b. $(2x-1)^3 2x$ c. $(2x-1)^3 (x^2+1)$

d. $3 (x^2+1)$ e. $\frac{6}{2x-1} + \frac{2x}{x^2+1}$

9. $y = e^{2 \ln (x+1)}$

a. $2 (x+1)$ b. $x+1$ c. 1 d. $2 \ln (x+1)$

e. $e^{2 \ln (x+1)}$

In problems 10 - 13, solve the given equations for x.

10. $\ln x^2 = 6$

Answer x = _____.

11. $e^{2x+1} = 1$

Answer x = _____.

12. $\ln \ln x = 0$

Answer x = _____.

13. $e^x - 2e = 0$

Answer x = _____.

In problems 14 and 15, simplify the following expressions

14. $e^{-\ln 3} + e^{\frac{1}{2} \ln 4}$

Answer x = _____.

15. $\ln (e^{(\ln 6)/3})$

Answer x = _____.

16. $y = e^{(x^2 - x)}$

a. $e^{x^2 - x}$ b. $e^{x^2 - x} (2x - 1)$ c. $2x - 1$

d. $(e^{x^2}/e^x)\ 2x$ e. $(x^2 - x)\ e$

17. $y = (3x - 1)/e^x$

a. $(3x + 1)/e^x$ b. $(3x - 1)/e^{2x}$ c. $3/e^x$

d. $(3x - 1)/e^x$ e. $(4 - 3x)/e^x$

18. $y = (2x + 1) \ln x$

a. $(2x + 1)/x + 2 \ln x$ b. $2x + 1/x$ c. $2/\ln x$

d. $2 \ln x$ e. $2/x + \ln x$

19. $y = \{\ln (2x - 1)\}^7$

a. $7\ \{\ln (2x - 1)\}^6$ b. $14\ \{\ln (2x - 1)\}^6$

c. $14\ \{\ln (2x - 1)\}^6/(2x - 1)$ d. $14/(2x - 1)$

e. $1/(2x - 1)^7$

20. $y = \ln \{(2x + 1)^7\}$

a. $7 \{\ln (2x - 1)\}^6$ b. $14 \{\ln (2x + 1)\}^6$

c. $14 \{\ln (2x + 1)\}^6/2x + 1$ d. $14/(2x + 1)$

e. $1/(2x + 1)^7$

21. $y = e^{3 \ln (x^2 + 1)}$

a. $e^{3 \ln (x^2 + 1)}$ b. $3/x^2 + 1$ c. $6x (x^2 + 1)^2$

d. $6x/x^2 + 1$ e. $6 \times e^{3 \ln (x^2 + 1)}$

22. $y = (2x - 1)(3x - 1)(4x - 1)$

a. $(3x - 1)(4x - 1) + (2x - 1)(4x - 1) + (2x - 1)(3x - 1)$
b. $(3x - 1)(4x - 1) + (2x - 1)(4x - 1)$
c. $(2x - 1)(3x - 1) + (3x - 1)(4x - 1)$
d. $2(3x - 1)(4x - 1) + 3(2x - 1)(4x - 1) + 4(2x - 1)(3x - 1)$
e. $24(2x - 1)(3x - 1)(4x - 1)$

23. $y = \ln \{(x + 1)^2/(3x + 1)\}$

a. $\frac{3x + 1}{(x + 1)^2}$ b. $2(x + 1)/(3x + 1)$ c. $\frac{1}{x + 1} - \frac{3}{3x + 1}$

d. $\frac{3}{x + 1} - \frac{2}{3x + 1}$ e. $\frac{2}{x + 1} - \frac{3}{3x + 1}$

24. $y = e^x/\ln x$

a. $\frac{e^x(\ln x - 1/x)}{(\ln x)^2}$ b. $\frac{e^x(1 + 1/x)}{(\ln x)^2}$ c. $e^x\, x/\ln x$

d. e^x/x e. $e^x/\ln x$

25. $y = \ln \ln (x^2 + 1)$

a. $2/\ln (x^2 + 1)$ b. $2x/\ln (x^2 + 1)$ c. $2/(x^2 + 1)$

d. $2x/\{(x^2 + 1) \ln (x^2 + 1)\}$ e. $\frac{\ln x}{\ln (x^2 + 1)}$

In problems 26-27, solve the equations for t.

26. $3\, e^{-2t} = 1$

answer t = _____

27. $e^t = 5e^2$

answer t = _____

28. $e^{\ln 2 + \ln 3}$

answer _____

29. $\ln (e^5)^3$

answer _____

30. The demand equation for a certain commodity is

$$\frac{1}{4} x^2 - 30x + 900 ; \quad 0 \le x \le 60$$

Find the value of x and the corresponding price p that maximize the revenue.

31. Suppose the demand equation for a monopolist is

$p = 150 - .02x$ and the cost function is is $C(x) = 10x + 300$

Find the value of x that maximizes the profit.