

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

**Solve the problem.**

- 1) A hotel has 230 units. All rooms are occupied when the hotel charges \$110 per day for a room. For every increase of  $x$  dollars in the daily room rate, there are  $x$  rooms vacant. Each occupied room costs \$34 per day to service and maintain. What should the hotel charge per day in order to maximize daily profit? 1) \_\_\_\_\_
- A) \$77                      B) \$177                      C) \$187                      D) \$170

- 2) A local office supply store has an annual demand for 10,000 cases of photocopier paper per year. It costs \$4 per year to store a case of photocopier paper, and it costs \$60 to place an order. Find the optimum number of cases of photocopier paper per order. 2) \_\_\_\_\_
- A) 173                      B) 387                      C) 300,000                      D) 548

- 3) The stadium vending company finds that sales of hot dogs average 37,000 hot dogs per game when the hot dogs sell for \$2.50 each. For each 50 cent increase in the price, the sales per game drop by 5000 hot dogs. What price per hot dog should the vending company charge to realize the maximum revenue? 3) \_\_\_\_\_
- A) \$3.10                      B) \$1.20                      C) \$3.35                      D) \$3.70

- 4) A company estimates that the daily revenue (in dollars) from the sale of  $x$  cookies is given by  $R(x) = 885 + 0.02x + 0.0003x^2$ .  
Currently, the company sells 900 cookies per day. Use marginal revenue to estimate the increase in revenue if the company increases sales by one cookie per day.
- A) \$56.00                      B) \$0.56                      C) \$0.92                      D) \$92.00
- 4) \_\_\_\_\_

- 5) The profit, in dollars, from the sale of  $x$  compact disc players is  $P(x) = x^3 - 8x^2 + 9x + 7$ . Find the marginal profit when  $x = 10$ .
- A) \$290                      B) \$156                      C) \$149                      D) \$297
- 5) \_\_\_\_\_

Use the differential to find a decimal approximation of the radical expression. Round to four decimal places.

- 6)  $\sqrt{35}$
- A) 5.8333                      B) 5.0000                      C) 5.9167                      D) 6.0833
- 6) \_\_\_\_\_

**Differentiate.**

- 7)  $f(x) = e^{3x}$
- A)  $\frac{1}{3}e^{3x}$                       B)  $3e^x$                       C)  $e^{3x}$                       D)  $3e^{3x}$
- 7) \_\_\_\_\_

8)  $f(x) = 4e^{-7x}$

A)  $28e^{-7x}$

B)  $-28e^{-7x}$

C)  $4e^{-7x}$

D)  $-7e^{-7x}$

8) \_\_\_\_\_

9)  $y = e^{9x^2 + x}$

A)  $18xe + 1$

B)  $18xe^{2x} + 1$

C)  $18xe^{9x^2} + 1$

D)  $18xe^{x^2} + 1$

9) \_\_\_\_\_

**Find the derivative.**

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

A)  $10xe^{3x}(2x + 3)$

B)  $5xe^{3x}(2x + 3)$

C)  $10ex^{3x}(3x + 2)$

D)  $5xe^{3x}(3x + 2)$

10) \_\_\_\_\_

11)  $y = (x^2 - 2x + 1) e^x$

A)  $(x^2 + 4x - 1) e^x$

B)  $(2x - 2) e^x$

C)  $(x^2 - 1) e^x$

D)  $\left(\frac{x^3}{3} - 1x + 1\right) e^x$

11) \_\_\_\_\_

**Solve the problem.**

- 12) The nationwide attendance per day for a certain motion picture can be approximated using the equation  $A(t) = 12t^2e^{-t}$ , where  $A$  is the attendance per day in thousands of persons and  $t$  is the number of months since the release of the film. Find and interpret the rate of change of the daily attendance after 4 months. 12) \_\_\_\_\_
- A) 1.758 thousand persons/day · month; the change in the daily attendance is increasing.  
B) -1.758 thousand persons/day · month; the daily attendance is decreasing.  
C) 3.517 thousand persons/day · month; the daily attendance is increasing.  
D) -3.517 thousand persons/day · month; the change in daily attendance is decreasing.

**Solve the exponential equation for  $t$ . Round your answer to three decimal places if necessary.**

- 13)  $e^{0.08t} = 3$  13) \_\_\_\_\_  
A) 5.964                      B) 0.088                      C) 37.5                      D) 13.733

- 14)  $e^{-0.07t} = 0.9$  14) \_\_\_\_\_  
A) 0.105                      B) -1.505                      C) 1.505                      D) -12.857

**Solve the problem.**

- 15) If \$3000 is invested in an account that pays interest compounded continuously, how long will it take to grow to \$9000 at 6%? 15) \_\_\_\_\_  
A) 11.0 years                      B) 18.4 years                      C) 6.6 years                      D) 18.3 years

- 16) At what interest rate would a deposit of \$45,000 grow to \$73,454 in 10 years with continuous compounding? 16) \_\_\_\_\_  
A) 7.9%                      B) 2.9%                      C) 5.9%                      D) 4.9%

- 17) In 1990, a company's profit was 43.1 million dollars. In 2000, the company's profit was 117.2 million dollars. Assume that the growth of the company's profit follows the exponential model and use 1990 as the base ( $t = 0$ ). Estimate what the company's profit will be in 2010. 17) \_\_\_\_\_
- A) \$318.5 million      B) \$636.9 million      C) \$238.9 million      D) \$573.2 million

- 18) Following the birth of a child, a parent wants to make an initial investment  $P_0$  that will grow to \$47,000 by the child's 20th birthday. Interest is compounded continuously at 7.8%. What should the initial investment be? 18) \_\_\_\_\_
- A) \$9382.58      B) \$223,664.6      C) \$9876.4      D) \$18,359.38

- 19) A business estimates that the salvage value  $V$  of a piece of machinery after  $t$  years is given by 19) \_\_\_\_\_

$$V(t) = \$33,000e^{-0.49t}.$$

After what amount of time will the salvage value be \$488?

- A) After 10.6 years      B) After 8.6 years      C) After 7.6 years      D) After 9.6 years

- 20) Rejoyne Inc. has a marginal-profit function given by 20) \_\_\_\_\_

$$P'(x) = -2x + 140, \quad \text{where } P'(x) \text{ is in dollars per unit.}$$

This means that the rate of change of total profit with respect to the number of units produced,  $x$ , is  $P'(x)$ . Find the total profit from the production and sale of the first 30 units.

- A) \$3300      B) \$80      C) \$110      D) \$6600

Evaluate.

21)  $\int 2x^8 dx$

A)  $18x^8 + C$

B)  $16x^7 + C$

C)  $18x^9 + C$

D)  $\frac{2}{9}x^9 + C$

21) \_\_\_\_\_

22)  $\int (2x^5 - 7x^3 + 4) dx$

A)  $\frac{1}{3}x^6 - \frac{7}{4}x^4 + 4x + C$

B)  $6x^6 - \frac{7}{3}x^4 + 4x + C$

C)  $6x^6 - \frac{7}{4}x^4 + 4x + C$

D)  $\frac{1}{2}x^6 - \frac{7}{3}x^4 + 4x + C$

22) \_\_\_\_\_

23)  $\int 11x^{-6} dx$

A)  $\frac{55}{x^5} + C$

B)  $-\frac{11}{5}x^{-5} + C$

C)  $\frac{11}{5x^7} + C$

D)  $-66x^{-7} + C$

23) \_\_\_\_\_

24)  $\int \frac{162}{x} dx$

A)  $\ln\left(\frac{x}{162}\right) + C$

B)  $81x^{-2} + C$

C)  $162 \ln x + C$

D)  $162x + C$

24) \_\_\_\_\_

25)  $\int 8e^{4x} dx$

A)  $4e^{4x} + C$

B)  $\frac{1}{2} e^{4x} + C$

C)  $2e^{4x} + C$

D)  $\frac{1}{4} e^{4x} + C$

25) \_\_\_\_\_

## Answer Key

Testname: 1106 PRACTICE TEST 3 FALL 2009

- 1) C
- 2) D
- 3) A
- 4) B
- 5) C
- 6) C
- 7) D
- 8) B
- 9) C
- 10) D
- 11) C
- 12) B
- 13) D
- 14) C
- 15) D
- 16) D
- 17) A
- 18) C
- 19) B
- 20) A
- 21) D
- 22) A
- 23) B
- 24) C
- 25) C