TEST–2   **Business Calculus (MAC 2233)**

Name_____   Date_____

Find the equation of the tangent line to f(x)at the given value of x.

1) $f(x) = x^3 - 4x + 3$ at $x = 2$

Find the equation of the tangent line to the graph of the given function at the given value of x

2) $f(x) = (x^2 + 28)^{4/5}$; $x = 2$

Find the derivative.(no need to simlify the answer)

3) $f(x) = \dfrac{x + 3}{\sqrt{x}}$, find $f'(x)$

Find f′(x) for the following function.

4) $(x^2 - 2x + 2)(3x^3 - x^2 + 5)$

Find the derivative.

5) Find $f'(x)$ for $f(x) = 8e^x + 4\ln(x^3)$.

6) Find $f'(x)$ for $f(x) = x^2 \ln 7x$.

7) $y = e^{x^4} \ln x$

Differentiate.

8) Find $\dfrac{dy}{dx}$ for $y = \dfrac{9x - 4}{8x^2 + 3}$

Provide an appropriate response.

9) Find $\dfrac{dy}{dx}$ for $y = \ln(7x^3 - x^2)$

10) Find $\dfrac{dy}{dx}$ for $y = 8^{x-1}$

Solve the problem.

11) Given: $C(x) = 0.3x^3 - 3x^2 + 20x + 40; x = 70$
    Assume C(x) is in dollars.
    i)   Determine the marginal cost function MC.
    ii) For the given production level, x, evaluate MC(x) and interpret.
    iii) Evaluate the actual change in cost by evaluating $C(x + 1) - C(x)$ and compare with the answer to part ii.

12) The yearly enrollment at a certain university can be modeled by the function
    $$f(x) = 1.98x^2 + 48.37x + 359.6, \qquad 1 \le x \le 10$$
    where x is the number of year since 1992. Determine f′(8) and interpret.

Use the compound interest formula to determine the final value of the given amount.

    13) $420 at 5% compounded continuously for 4 years

Solve the problem.

    14) How long must $5700 be in a bank at 7% compounded annually to become $13,736.12? (Round to the nearest year.)

Find dy for the given values of x and Δx.

    15) $y = x^3 - 4x^2 + 2x + 1;$ $x = 8, \Delta x = -0.3$

1) $y = 8x - 13$

2) $y = \dfrac{8}{5}x + \dfrac{64}{5}$

3) $\dfrac{1}{2\sqrt{x}} - \dfrac{3}{2\,x^{3/2}}$

4) $15x^4 - 28x^3 + 24x^2 + 6x - 10$

5) $8e^x + \dfrac{12}{x}$

6) $f'(x) = x(1 + 2\ln|7x|)$

7) $\dfrac{e^{x^4} + 4x^4\,e^{x^4}\ln x}{x}$

8) $\dfrac{dy}{dx} = \dfrac{-72x^2 + 64x + 27}{(8x^2 + 3)^2}$

9) $\dfrac{21x - 2}{7x^2 - x}$

10) $8^{x-1}\ln(8)$

11) i) $MC(x) = 0.9x^2 - 6x + 20$

ii) $MC(70) = 4010$; The estimated cost of producing the 71st unit is \$4010.

iii) $C(71) - C(70) = 4070.3$; The actual cost of producing the 71st unit is \$4070.30. The estimate in part ii is off by \$60.30.

12) $f'(8) = 80.05$; In 2000, the enrollment was increasing at a rate of 80.05 students per year.

13) \$512.99

14) 13 yr

15) -39