1)   If $f(x) = 5x^2 - 3$ and $g(x) = 2x + 3$, find $g[f(x)]$.

A. $10x^2$
B. $20x^2 + 60x + 42$
C. $10x^2 - 3$
D. $20x^2 + 42$
E. $10x^2 + 30x + 21$

2)   Find $f'(x)$ or the derivative of f, if $f(x) = (4x^4 - 7x^2 + 2)^3$. (Write answer completely factored.)

A. $f'(x) = 6x(8x^2 - 7)(4x^4 - 7x^2 + 2)^2$
B. $f'(x) = 3(16x^3 - 14x)^2$
C. $f'(x) = 3x(8x^2 - 7)(4x^4 - 7x^2 + 2)^2$
D. $f'(x) = 3(4x^4 - 7x^2 + 2)^2$
E. $f'(x) = 6x(8x^2 - 7)(4x^4 - 7x^2 + 2)$

3)   Find the derivative of the function below. (Completely factor the derivative.)

$y = -4x(2x^2 - 3)^5$

A. $-4(2x^2 - 3)^4(20x^2 + 2x - 3)$
B. $(2x^2 - 3)^4(1 - 80x^2)$
C. $-4(2x^2 - 3)(22x^2 - 3)$
D. $-4(2x^2 - 3)^4(22x^2 - 3)$
E. $15360x^2(2x^2 + 3)^4$

4)   If $f(x) = e^{-x}(\ln x)$, find $f'(x)$ when $x = 1$.

A.   0

B. $f'(1)$ does not exist.

C. $\dfrac{2}{e}$

D. e

E. $\dfrac{1}{e}$

5)   Solve the equation below. Then, select the correct choice that describes the solution.

$$32^{2x-3} = 16^{x+1}$$

A.   The solution is greater than 3.

B.   The solution is less than 0.

C.   The solution is greater than 0, but less than 1.

D.   The soltuion is greater than 1, but less than 2.

E.   The solution is greater than 2, but less than 3.

6)   Which statement(s) in the box below is(are) true?

I	$\log_3 9 = 2$ is equivalent to $3^2 = 9$.
II	$\ln 21$ is approximately 1.322.
III	$\log_b 50 = \log_b 5 + \log_b 10$.

A.   I and III only.

B.   III only.

C.   II and III only.

D.   I and II only.

E.   None are true.

7)   Julie deposits $1500 in an account that earns a 3% interest rate compounded quarterly. If she leaves the money to grow, how much **interest** has the account earned in 8 years? Round to the nearest dollar. (See the formulas on the cover sheet.)

     A. $92
     B. $405
     C. $46
     D. $140
     E.   None of the above.

8)   If $\log_2 32 = a$, $\log_2 3 = b$, and $\log_2 7 = c$, find an expression to represent $\log_2\left(\dfrac{21}{32}\right)$.

     A. $bc - a$
     B. $a - b - c$
     C. $\dfrac{bc}{a}$
     D. $b + c - a$
     E. $-abc$

9)   Approximate the solution of this equation (rounded to 3 decimal places).

$$2^x = 11$$

     A.   0.289
     B.   3.317
     C.   3.091
     D.   1.662
     E.   3.459

10)   Find the derivative of the function below. Factor your answer.

$$y = \ln(x^2 + 24x)$$

A. $y' = \dfrac{x+12}{x(x+24)}$

B. $y' = \dfrac{2(x+12)}{x(x+24)}$

C. $y' = \dfrac{x+12}{x+24}$

D. $y' = \dfrac{1}{x^2} + \dfrac{1}{24x}$

E. $y' = \dfrac{1}{x(x+24)}$

11)   Find the derivative of function f given below.

$$f(x) = \dfrac{e^x}{3\ln x}$$

A. $f'(x) = \dfrac{e^x \left(\ln x^3 - \dfrac{1}{x^3} \right)}{9(\ln x)^2}$

B. $f'(x) = \dfrac{e^x \left(\dfrac{1}{x} - 1 \right)}{3(\ln x)^2}$

C. $f'(x) = \dfrac{e^x (\ln x - 1)}{3(\ln x)^2}$

D. $f'(x) = \dfrac{xe^x}{3}$

E. $f'(x) = \dfrac{e^x \left(\ln x - \dfrac{1}{x} \right)}{3(\ln x)^2}$

12)   Find the value of x where the tangent to the graph of $y = xe^{-x}$ is horizontal.

        A.   0

        B. $\dfrac{1}{e}$

        C. $-\dfrac{1}{e}$

        D.   1

        E. -1

13)   Given: function $y = xe^x$, with first derivative $\dfrac{dy}{dx} = xe^x + e^x$ and second derivative

$$\dfrac{d^2 y}{dx^2} = xe^x + 2e^x.$$

Which of the following statements is(are) true?

I	The function is increasing on the interval $(-1, \infty)$.
II	The function is concave upward on the interval $(-2, \infty)$.
III	The function is decreasing on the interval $(-\infty, 2)$.
IV	There is no interval where the function is concave downward.

        A.   II and III only

        B.   I and II only

        C.   I only

        D.   I, III, and IV only

        E.   I and IV only

14) Which statement below is true about the graph of the function $f(x) = \dfrac{x^2 + 4}{2 + 7x - 4x^2}$?

     A. The line $x = 1$ is a vertical asymptote.

     B. The line $y = \dfrac{1}{4}$ is a horizontal asymptote.

     C. The line $x = -\dfrac{1}{4}$ is a vertical asymptote.

     D. The graph has no vertical or horizontal asymptotes.

     E. The line $y = 2$ is a horizontal asymptote.

15) Find the second derivative of $y = e^x (x - 1)^2$.

     A. $e^x (x - 1)^2$

     B. $e^x (x^2 + 2x - 1)$

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

     D. $2e^x (x - 1)$

     E. $2e^x$