Name: _____ Class: _____ Date: _____ ID: A

erivatives of Exponential and Trig Functions Mock Test (Ch 5)

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Determine $f'(x)$ for the function $f(x) = 5e^{4x-9\pi}$.
a. $f'(x) = -25e^{4x-9\pi}$
b. $f'(x) = 20e^{4x-9\pi}$
c. $f'(x) = -45e^{4x}$
d. $f'(x) = 5e^{4x-9\pi}$

____ 2. Determine the derivative $\frac{dy}{dx}$ of $y = (12)^{-4x+9}$.
a. $\frac{dy}{dx} = -(12)^{-4x+9} \times \ln 4$
b. $\frac{dy}{dx} = -4(12)^{-4x+9} \times \ln 4$
c. $\frac{dy}{dx} = -4(12)^{-4x+9} \times \ln 12$
d. $\frac{dy}{dx} = -(12)^{-4x+9} \times \ln 12$

____ 3. Which of the following x-coordinates is a candidate for being an extreme value for the function $f(x) = -0.5x^2 2^x$?
a. $\frac{1}{2}$
b. 0
c. 1
d. 2

____ 4. Determine the derivative $\frac{dy}{dx}$ for $y = 3\cos(8x + 6)$.
a. $\frac{dy}{dx} = 24\sin(8x + 6)$
b. $\frac{dy}{dx} = -24\cos(8x + 6)$
c. $\frac{dy}{dx} = -24\sin(8x + 6)$
d. $\frac{dy}{dx} = 24\cos(8x + 6)$

____ 5. Determine the derivative $\frac{dy}{dx}$ for $y = \tan^2(e^x)$.
a. $\frac{dy}{dx} = 2\tan(e^x)$
b. $\frac{dy}{dx} = 2e^x \tan(e^x)$
c. $\frac{dy}{dx} = 2e^x \tan(e^x)\sec^2(e^x)$
d. $\frac{dy}{dx} = 2\tan(e^x)\sec^2(e^x)$

Short Answer

6. What is the slope of the tangent to the function $f(x) = 4xe^x$ at the point with x-coordinate $x = 0$?

7. Determine the derivative of the function $f(x) = (7^x)(x^7)$.

8. Determine the maximum and minimum value of the function $f(x) = 3x3^x - 1$.

9. Explain why there is no maximum or minimum value for the function $f(x) = (-2)^x$.

10. Differentiate the function $f(x) = 5^{\tan\sqrt{x}}$.

Problem

11. The velocity of a car is given by $v(t) = 60(1-(0.7)^t)$, where v is measured in m/s and t is measured in s.
    a. Determine the acceleration function.
    b. Determine the acceleration at $t = 2$s.
    c. What is the initial velocity and what does this mean physically?
    d. Determine the time at which the acceleration is 3 m/s^2.

12. The population of a town after t weeks is given by $P(t) = 1200(2^{-t})$.
    a. What is the initial population of the town?
    b. How many people are there after 1 week?
    c. What is the rate of change of people after 1 week?

13. A particle moves along a line so that, at time t, its position is $s(t) = 11\cos(3t)$, $t \geq 0$.
    a. What is the first time t that the particle changes direction?
    b. For what values of t does the particle change direction?
    c. What is the particle's maximum velocity?

14. a. Explain how to derive the derivative of the function $f(x) = \cot x$ two different ways. (Hint: Actually, there are at least 4 different ways and they are all similar but use different rules.)
    b. Derive the derivative using one of the two ways.

15. a. Determine $\frac{dy}{dx}$ for $y = \sqrt{\tan x}$.
    b. State any values of x for which the function is not differentiable.