AP Calculus BC—Dr. Quatttrin Name_____
Derivative Test v8

Score_____

Directions: Show all work.

1. At what point on the graph of $y=\frac{1}{(x+1)^2}$ is the tangent parallel to the line $x-4y=-8$

(a) $\left(-6, \frac{1}{25}\right)$ (b) $\left(1, \frac{1}{4}\right)$ (c) $\left(-3, \frac{1}{4}\right)$

(d) $\left(-9, \frac{1}{64}\right)$ (e) $\left(3, \frac{1}{16}\right)$

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2. Given the functions $f(x)$ and $g(x)$ that are both continuous and differentiable, and that have values given on the table below.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
2	4	-2	8	1
4	10	8	4	3
8	6	-12	2	4

Given that $h(x)=f(g(x))$, $h'(8)=$

(a) -12 (b) -2 (c) -1 (d) -8 (e) 24

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3. Let $y = f(x)$ be the solution to the differential equation $\frac{dy}{dx} = \frac{4x}{y}$ with the initial condition $f(0) = 1$. What is the best approximation for $f(1)$ if Euler's method is used, starting at $x = 1$ with a step size of 0.5?

a) 1 b) 2 c) 2.5 d) $\sqrt{5}$ e) 3

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4. Which of the following statements must be true?

I. $\frac{d}{dx}\left(x \sec^{-1} x\right) = \sec^{-1} x + \frac{x}{\sqrt{x^2 - 1}}$ II. $\frac{d}{dx}\left(\frac{3-2x}{3x+2}\right) = \frac{-13}{(3x+2)^2}$

III. $\frac{d}{dx}\ln(1-x) = \frac{1}{1-x}$

(a) I only (b) II only (c) III only

(d) II and III only (e) I and III

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5. Assume the volume of a sphere is increasing at $12\ in^3/\text{sec}$. When the volume of the sphere is $36\pi\ in^3$, how fast is the surface area increasing?

a. 8 b. 8π c. 6

d. $\frac{8\pi}{3}$ e. 10

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6. The slope of the line tangent to $xy - y^3 + 6 = 0$ at (1,2) is

a. 0 b. $\frac{2}{11}$ c. $\frac{1}{6}$ d. $\frac{1}{4}$ e. $-\frac{1}{12}$

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7. $\dfrac{d}{dx}\left[8x^3+7x^2-\dfrac{4}{3}x^{3/2}+e-\dfrac{5}{\sqrt[7]{x^5}}+\dfrac{2}{x}\right]$

8. Let $y=e^{2\ln x}+\sin^{-1}(\cos 2x)$. Find y'.

9. If $4x^2+9y^2=36$, find $\frac{d^2y}{dx^2}$ in lowest terms.

10. $f(x)=\ln(x^3+6x-2)$; find $f''(x)$.

11. According to the adiabatic law for expansion of air, $P \cdot V^{7/5} = \frac{4}{81}$, where P is pressure and V is volume. At a specific instant, P = 108 lb/in^2 and is increasing at 27 lb/in^2 per second. What is the rate of change of the volume at that moment?