AP Calculus AB Name____________________________

Derivative Review Practice Test

1. If $y = \ln(\sin x)$ and $0 \le x \le \pi$, then $\frac{dy}{dx}$ is

a. $-\tan x$ b. $-\cot x$ c. $\tan x$

d. $\cot x$ e. $\csc x$

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2. If $y = \sin^{-1}\left(e^{2x}\right)$, then $\frac{dy}{dx}$ is

a. $\frac{2e^{2x}}{\sqrt{1-e^{4x}}}$ b. $\frac{e^{2x}}{\sqrt{1-e^{4x}}}$ c. $\frac{2e^{2x}}{\sqrt{1+e^{4x}}}$

d. $\frac{e^{2x}}{1+e^{4x}}$ e. $\frac{2e^{2x}}{\sqrt{e^{4x}-1}}$

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3. 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 $h(x) = g(g(x))$, $h'(8) =$

a) 1 b) 2 c) 3 d) 4 e) 8

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4. If $g(x)=\tan^2(e^x)$, then $g'(x)$ is

a. $2\tan(e^x)\sec^2(e^x)$ b. $2e^x\tan(e^x)\sec^2(e^x)$

c. $2\tan^2(e^x)\sec(e^x)$ d. $e^x\sec^2(e^x)$ e. $2e^x\tan(e^x)$

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5. Let $f(x)$ be the function with $f(2)=4$ and $f'(x)=\sqrt{x^3+1}$. Using the tangent line approximation to the graph of $f(x)$ at x=2, estimate $f(2.2)$.

a. 4.0 b. 4.2 c. 4.4 d. 4.6 e. 4.8

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6. Which of the following statements must be true?

I. $\frac{d}{dx}\sqrt{e^x+3}=\frac{e^x}{2\sqrt{e^x+3}}$ II. $\frac{d}{dx}(\ln\cos x)=\tan x$

III. $\frac{d}{dx}\left(6x^3-\pi+\sqrt[3]{x^8}-\frac{2}{x^3}\right)=18x^2+\frac{8}{3}\sqrt[3]{x^5}+\frac{6}{x^4}$

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

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

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7. The value of the derivative of $y=\frac{(x^2-3)^3}{(5x-9)^2}$ at $x=2$ is

a. -4 b. -2 c. 0 d. 2 e. 4

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8. $\frac{d}{dx}\left[x^7 - 4\sqrt[8]{x^7} + 7^x - \frac{1}{\sqrt[7]{x^4}} + \frac{1}{5x}\right]$

9. $D_x\left[e^{3x^2}\cos 4x\right]$

10. $f(x) = e^{\sin 4x}$; find the exact value of $f''\left(\frac{\pi}{4}\right)$.

11. A fourth differentiable function is defined for all real numbers and satisfies each of the following:

$$g(2)=5,\ g'(2)=-2, \text{ and } g''(2)=3$$

and the function f is given by $f(x)=e^{k(x-1)}+g(2x)$, where k is a constant.

a. Find $f(1)$, $f'(1)$, $f''(1)$

b. Show that the fourth derivative of f is $k^4e^{k(x-1)}+16g^{IV}(2x)$