Calculus AP Style Questions Name _____

Date _____ Period _____

Derivatives

All questions are to be answered <u>without the use of a calculator</u>.
Please show all your work. No credit will be given for a correct multiple choice answer without complete work or explanation to justify your choice.

1. If $y = \dfrac{3}{4+x^2}$, then $\dfrac{dy}{dx} =$

(A) $\dfrac{3}{2x}$

(B) $\dfrac{3x}{(4+x^2)^2}$

(C) $\dfrac{6x}{(4+x^2)^2}$

(D) $\dfrac{-6x}{(4+x^2)^2}$

(E) $\dfrac{-3}{(4+x^2)^2}$

2. If $\cos x = e^y$ and $0 < x < \dfrac{\pi}{2}$, what is $\dfrac{dy}{dx}$ in terms of x?

(A) $-\tan x$
(B) $-\cot x$
(C) $\cot x$
(D) $\tan x$
(E) $\csc x$

3. If $y = \cos^2(2x)$, then $\dfrac{dy}{dx} =$,

(A) $2\cos 2x \sin 2x$
(B) $-4\sin 2x \cos 2x$
(C) $2\cos 2x$
(D) $-2\cos 2x$
(E) $4\cos 2x$

4. Of $g(x) = \sin^{-1}(2x)$, then $g'(x) =$

(A) $2\cos^{-1} 2x$

(B) $2\csc 2x \cot 2x$

(C) $\dfrac{2}{1+4x^2}$

(D) $\dfrac{2}{\sqrt{4x^2-1}}$

(E) $\dfrac{2}{\sqrt{1-4x^2}}$

5. $\lim\limits_{h\to 0} \dfrac{\tan 2(x+h) - \tan(2x)}{h}$ is

(A) 0

(B) $2\cot(2x)$

(C) $\sec^2(2x)$

(D) $2\sec^2(2x)$

(E) nonexistent

6. If $h(2) = -3$, $h'(2) = \dfrac{1}{4}$, $h'(-3) = \dfrac{1}{3}$. Compute $\left(h^{-1}\right)'(-3)$.

(A) $\dfrac{1}{4}$

(B) $\dfrac{1}{3}$

(C) 4

(D) 3

(E) $-\dfrac{1}{3}$

7. If $y = \dfrac{2-x}{3x+1}$, then $\dfrac{dy}{dx} =$

(A) $\dfrac{-7}{(3x+1)^2}$

(B) $\dfrac{-9}{(3x+1)^2}$

(C) $\dfrac{6x-5}{(3x+1)^2}$

(D) $\dfrac{7}{(3x+1)^2}$

(E) $\dfrac{7-6x}{(3x+1)^2}$

8. If $y = \sqrt{3-2x}$, then $y' =$

(A) $\dfrac{1}{2\sqrt{3-2x}}$

(B) $\dfrac{-1}{\sqrt{3-2x}}$

(C) $-\dfrac{(3-2x)^{3/2}}{3}$

(D) $-\dfrac{1}{3-2x}$

(E) $\dfrac{2}{3}(3-2x)^{3/2}$

9. If $f(x) = \cos x \sin 3x$, then $f'\left(\dfrac{\pi}{6}\right)$ is equal to

(A) $\dfrac{1}{2}$

(B) $-\dfrac{\sqrt{3}}{2}$

(C) $-\dfrac{1}{2}$

(D) 1

(E) 0

10. The derivative of $(4x+1)(1-x)^3$ is

(A) $-12(1-x)^2$
(B) $(1-x)^2(1+8x)$
(C) $(1-x)^2(1-16x)$
(D) $3(1-x)^2(4x+1)$
(E) $(1-x)^2(16x+7)$

11. If $f(x)=3+|x-2|$, then $f'(1)$ is

(A) 3
(B) 1
(C) -1
(D) 2
(E) nonexistent

12. If $y=\ln\dfrac{e^x}{e^x-1}$, find $\dfrac{dy}{dx}$.

(A) $x-\dfrac{e^x}{e^x-1}$
(B) $\dfrac{1}{e^x-1}$
(C) $-\dfrac{1}{e^x-1}$
(D) 0
(E) $\dfrac{e^x-2}{e^x-1}$

13. $y = \ln(\sec x \tan x)$. Find $\frac{dy}{dx}$.

(A) $\sec x$

(B) $\frac{1}{\sec x}$

(C) $\tan x + \frac{\sec^2 x}{\tan x}$

(D) $\frac{1}{\sec x} + \tan x$

(E) $\frac{1}{\sec x \tan x}$

14. If $y = \sec^2 \sqrt{x}$, find y'.

(A) $\frac{\sec\sqrt{x}\tan\sqrt{x}}{\sqrt{x}}$

(B) $\frac{\tan\sqrt{x}}{\sqrt{x}}$

(C) $2\sec\sqrt{x}\tan^2\sqrt{x}$

(D) $\frac{\sec^2\sqrt{x}\tan\sqrt{x}}{\sqrt{x}}$

(E) $2\sec^2\sqrt{x}\tan\sqrt{x}$

15. If $x = t - \sin t$ and $y = 1 - \cos t$, then $\frac{dy}{dx} =$

(A) $\frac{\sin t}{1-\cos t}$

(B) $\frac{1-\cos t}{\sin t}$

(C) $\frac{\sin t}{\cos t - 1}$

(D) $\frac{1-x}{y}$

(E) $\frac{1-\cos t}{1-\sin t}$

16. Consider the curve given by the equation $y^3 - 3xy = 2$.

a) Find $\frac{dy}{dx}$.

b) Write an equation for the line tangent to the curve at the point (1,2).

c) Find $\frac{d^2y}{dx^2}$ at the point (1,2).

17. Let f be a function defined by $f(x) = \ln\left(\frac{x}{x+1}\right)$.

a) What is the domain of f ?

b) Find $f'(x)$.

c) Find an equation for the tangent line to the graph of f at the point $(1, f(1))$.

d) Write $g(x)$ where g is the inverse of f .

e) Write an expression for $g'(x)$.