AB Calculus Chapter 3 Review - Multiple Choice Name_____period_____

Show all work on a separate sheet of paper then choose the correct multiple choice response. Correct answer choices are provided therefore, letter choice answers alone are insufficient work. Your communication of the process leading to your answer is absolutely, positively crucial!

1. $\left.\dfrac{d}{dx}\left(\dfrac{1}{x^3}-\dfrac{1}{x}+x^2\right)\right|_{x=-1} =$

(A) -6 (B) -4 (C) 0 (D) 2 (E) 6

2. At what point on the graph of $y=\dfrac{1}{2}x^2$ is the tangent line parallel to the line $2x-4y=3$?

(A) $\left(\dfrac{1}{2},-\dfrac{1}{2}\right)$ (B) $\left(\dfrac{1}{2},\dfrac{1}{8}\right)$ (C) $\left(1,-\dfrac{1}{4}\right)$ (D) $\left(1,\dfrac{1}{2}\right)$ (E) $(2,2)$

3. Which of the following is an equation of the line tangent to the graph of $f(x)=x^4+2x^2$ at the point where $f'(x)=1$?

(A) $y=8x-5$ (B) $y=x+7$ (C) $y=x+0.763$
(D) $y=x-0.122$ (E) $y=x-2.146$

4. Let f and g be differentiable functions with the following properties: (i) $g(x)>0$ for all x (ii) $f(0)=1$
If $h(x)=f(x)g(x)$ and $h'(x)=f(x)g'(x)$, then $f(x)=$

(A) $f'(x)$ (B) $g(x)$ (C) e^x (D) 0 (E) 1

5. An equation of the line tangent to the graph of $y=\dfrac{2x+3}{3x-2}$ at the point $(1,5)$ is

(A) $13x-y=8$ (B) $13x+y=18$ (C) $x-13y=64$
(D) $x+13y=66$ (E) $-2x+3y=13$

6. If $f(x)=\dfrac{e^{2x}}{2x}$, then $f'(x)=$

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

7. If $f(x)=(x-1)^2\sin x$, then $f'(0)=$

(A) -2 (B) -1 (C) 0 (D) 1 (E) 2

8. An equation of the line tangent to the graph of $y=x+\cos x$ at the point $(0,1)$ is

(A) $y=2x+1$ (B) $y=x+1$ (C) $y=x$ (D) $y=x-1$ (E) $y=0$

9. If $f(x)=(x^2-2x-1)^{\frac{2}{3}}$, then $f'(0)$ is

(A) $\dfrac{4}{3}$ (B) 0 (C) $-\dfrac{2}{3}$ (D) $-\dfrac{4}{3}$ (E) -2

10. $\dfrac{d}{dx}\cos^2(x^3)=$ (A) $6x^2\sin(x^3)\cos(x^3)$ (B) $6x^2\cos(x^3)$ (C) $\sin^2(x^3)$
(D) $-6x^2\sin(x^3)\cos(x^3)$ (E) $-2\sin(x^3)\cos(x^3)$

13. If $y=\text{Arctan}(\cos x)$, then $\dfrac{dy}{dx}=$

(A) $\dfrac{-\sin x}{1+\cos^2 x}$ (B) $-\left(\text{Arcsec}(\cos x)\right)^2\sin x$ (C) $\left(\text{Arcsec}(\cos x)\right)^2$ (D) $\dfrac{1}{\left(\text{Arccos}\,x\right)^2+1}$ (E) $\dfrac{1}{1+\cos^2 x}$

14. If $y=\cos^2 x-\sin^2 x$, then $y'=$

(A) -1 (B) 0 (C) $-2\sin(2x)$ (D) $-2(\cos x+\sin x)$ (E) $2(\cos x-\sin x)$

15. If $y = 2\cos\left(\frac{x}{2}\right)$, then $\frac{d^2y}{dx^2} =$

(A) $-8\cos\left(\frac{x}{2}\right)$ (B) $-2\cos\left(\frac{x}{2}\right)$ (C) $-\sin\left(\frac{x}{2}\right)$ (D) $-\cos\left(\frac{x}{2}\right)$ (E) $-\frac{1}{2}\cos\left(\frac{x}{2}\right)$

17. The slope of the line tangent to the graph of $y = \ln\left(x^2\right)$ at $x = e^2$ is

(A) $\frac{1}{e^2}$ (B) $\frac{2}{e^2}$ (C) $\frac{4}{e^2}$ (D) $\frac{1}{e^4}$ (E) $\frac{4}{e^4}$

Answers:

1. B 2. B 3. D 4. E 5. B 6. E 7. D 8. B 9. A 10. D 13. A 14. C 15. E 17. B

AB Calculus: Chapter 3 Review Free Response

Name: _____

DIRECTIONS: Show all of your work on a separate sheet of paper! There is not enough room on this paper to adequately show your work. Your communication of the process leading to your answer is absolutely, positively crucial!

Non-Calculator

1. Find the derivative of $y = \frac{2-x}{3x+1}$

2. If $y = \sin^3(1-2x)$, find $\frac{dy}{dx}$.

3. Find the derivative of $y = 2\sin x + \cos(2x)$

4. The equation of the tangent line to the curve $y = x^2 - 4x$ at the point where the curve crosses the y-axis.

In problems 5 – 7, the motion of a particle on a straight line is given by $s(t) = t^3 - 6t^2 + 12t - 8$

5. Find the velocity function $v(t)$ and the values for t where the particle is at rest. (i.e., velocity is zero)

6. What is true about $v(t)$ when s is increasing? State t-intervals for which the motion of the particle $s(t)$ is increasing.

7. Find the acceleration function $a(t)$ and state t-intervals for which acceleration is positive.

8. If $f(x) = 16\sqrt{x}$, find $f'''(4)$

9. Find the derivative of $y = \ln(\sec x + \tan x)$

10. Find $\frac{dy}{dx}$ if $\ln(xy) = x + y$

11. Find $\lim_{x\to 0}\frac{\sin x}{2x}$

13. Find $\frac{dy}{dx}$ if $y = x^{1-x}$

Calculator

12. Differentiable functions f and g have the values shown in the table here:

If $h = f \bullet g$, find $h'(2)$

x	f	f'	g	g'
2	5	3	1	-2

13. Given the function $f(x) = x^3 - 2x + 1$ where $g(x) = f^{-1}(x)$, complete the following table & $f'(x) =$ _____

Evaluate	$f(0) =$	$f(2) =$	$f(-3) =$
Solve	$g(\_\_\_) = 0$	$g(\_\_\_) = 2$	$g(\_\_\_) = -1$
Evaluate	$f'(0) =$	$f'(2) =$	$f'(-1) =$
Evaluate	$g'(1) =$	$g'(13) =$	$g'(-20) =$

Use the same f(x) to evaluate

$g'(116) =$

You will need to use your calculator!

14. Use the table to find the Derivative of the Inverse Function at each value:

A) $(f^{-1})'(2) =$ B) $(f^{-1})'(3) =$ C) $(f^{-1})'(0) =$ D) $(f^{-1})'(-3) =$

x	1	2	3	4
$f(x)$	-3	0	2	3
$f'(x)$	5	4/3	-8	1/2