

**AP CALCULUS AB
TEST REVIEW: CHAPTER 3**

Non-Calculator

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

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

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

$$y' = \frac{(-1)(3x+1) - (2-x)(3)}{(3x+1)^2} = \frac{-3x-1-6+3x}{(3x+1)^2}$$

B. $\frac{6x-5}{(3x+1)^2}$

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

C. $\frac{-9}{(3x+1)^2}$

2. If $y = \sin^3(1-2x)$, find $\frac{dy}{dx} = 3 \sin^2(1-2x) \cdot \cos(1-2x) \cdot (-2) = -6 \sin^2(1-2x) \cos(1-2x)$

A. $3 \sin^2(1-2x)$

D. $-6 \cos^2(1-2x)$

B. $-2 \cos^3(1-2x)$

E. $-6 \sin^2(1-2x) \cos(1-2x)$

C. $-6 \sin^2(1-2x)$

3. Find the derivative of $y = 2 \sin x + \cos(2x)$ $y' = 2 \cos x - \sin(2x) \cdot 2 = 2 \cos x - 2 \sin(2x) = 2 \cos x - 4 \sin x \cos x$

A. $2 \cos x - \sin(2x)$

D. $2 \sin x \cos x$

B. $2 \sin(2x) - \cos(2x)$

E. $1 + \cos(2x)$

C. $2 \cos x(1-2 \sin x) = 2 \cos x(1-2 \sin x)$

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

A. $y = 8x - 4$

D. $y = 4x$

B. $y = -4x$

E. $y = 4x - 8$

C. $y = -4$ (crosses y-axis)

$$y' = 2x - 4$$

$$y'|_{(0,0)} = -4$$

$$y = 0^2 - 4(0) = 0$$

$$(0,0)$$

5. The slope of the curve $y^3 - xy^2 = 4$ at the point where $y = 2$ is

A. -2

B. $\frac{1}{4}$

C. $-\frac{1}{2}$

D. $\frac{1}{2}$

E. 2

$$3y^2 y' - (y^2 + 2xy y') = 0$$

$$y^2 + 2xy y' = 3y^2 y'$$

$$y'(2xy - 3y^2) = -y^2$$

$$y' = \frac{-y^2}{3y^2 - 2xy}$$

$$y'|_{(1,2)} = \frac{4}{3(4) - 2(1)(2)}$$

$$= \frac{1}{2}$$

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

6. The distance s is increasing for $s'(t) = 3t^2 - 12t + 12 = 3(t^2 - 4t + 4) = 3(t-2)(t-2) > 0$

A. $t < 2$

B. all t

C. $1 < t < 3$

D. $t > 2$

E. $t < 1$ or $t > 3$

7. The minimum value of the speed is

A. 1

B. 2

C. 3

D. 0

E. none of these

$$v'(t) = 6t - 12 = 0 \rightarrow t = 2 \quad v(2) = 3(2-2)(2-2) = 0$$

8. The acceleration is positive $a(t) = v'(t) = 6t - 12 > 0 \rightarrow t > 2$

A. when $t > 2$

D. for $1 < t < 3$

B. for all t except $t = 2$

E. for $1 < t < 2$

C. when $t < 2$

9. If $f(x) = 16\sqrt{x}$, find $f'''(4)$ $f = 16x^{1/2}$ $f' = 8x^{-1/2}$ $f'' = -4x^{-3/2}$ $f''' = 6x^{-5/2}$

A. $\frac{3}{16}$

B. -4

C. $-\frac{1}{2}$

D. 0

E. 6

10. Find the derivative of $y = \ln(\sec x + \tan x)$ $y' = \frac{1}{\sec x + \tan x} (\sec x \tan x + \sec^2 x) = \frac{\sec x (\tan x + \sec x)}{\sec x + \tan x}$

A. $\sec x$

B. $\cos x$

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

D. $\frac{1}{\sec x + \tan x}$

E. $\frac{-1}{\sec x + \tan x}$

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

$$\frac{1}{xy} (y + xy') = 1 + y'$$

$$y + xy' = xy + xy y'$$

$$y'(x - xy) = xy - y$$

A. $-\frac{y}{x}$

B. e^{x+y}

C. $\frac{xy}{1-xy}$

D. $\frac{xy-y}{x-xy}$

E. none of these

12. Find $\lim_{x \rightarrow 0} \frac{\sin x}{2x} = \frac{1}{2} \lim_{x \rightarrow 0} \frac{\sin x}{x} = \frac{1}{2} \cdot 1 = \frac{1}{2}$

A. $\frac{1}{2}$

B. $\frac{1}{4}$

C. 2

D. 1

E. 0