

ANSWERS

TEST REVIEW

Use this information to solve questions 1-4.

	$x=2$	$x=3$	$x=5$
$f(x)$	3	5	2
$f'(x)$	-1	2	6
$g(x)$	5	2	2
$g'(x)$	7	4	-3

1. If $h(x)=f(x)g(x)$, find $h'(2)$.

- a. -7 b. 16 c. 26 d. 32 e. none of these

$$h'(2) = g(2)f'(2) + f(2)g'(2)$$

$$h'(2) = (5)(-1) + (3)(7) = 16$$

2. If $h(x)=f(x)/g(x)$, find $h'(3)$.

- a. -4 b. -2 c. 6 d. 12 e. none of these

$$h'(3) = \frac{g(3)f'(3) - f(3)g'(3)}{g(3)^2} = \frac{(2)(2) - (5)(4)}{(2)^2} = -4$$

3. If $h(x)=f(g(x))$, find $h'(3)$.

- a. -4 b. -2 c. 2 d. 8 e. none of these

$$h'(3) = f'(g(3)) \cdot g'(3)$$

$$h'(3) = f'(2) \cdot 4 = (-1)(4) = -4$$

4. If $h(x)=f(x)+g(x)$, find $h'(5)$.

- a. 3 b. 4 c. 6 d. 8 e. none of these

$$h'(5) = f'(5) + g'(5)$$

$$h'(5) = (6) + (-3) = 3$$

5. If $y = \cos(2x)$, what is the equation of the line tangent to the curve at $x=0$?

- a. $y=0$ b. $y=1$ c. $y=-1$ d. $y=2$ e. none of these

pt: $(0, 1)$

Slope: $y'(x) = -\sin(2x) \cdot 2$

$y'(0) = 0$

$$\left. \begin{array}{l} y - 1 = 0(x - 0) \\ y = 1 \end{array} \right\}$$

Find the derivative. Use correct notation.

6. $g(x) = (2x-5)^8$

$$g'(x) = 8(2x-5)^7 \cdot 2$$

7. $y = \tan \sqrt{x} + \sqrt{\tan x}$

$$y' = \sec^2(\sqrt{x}) \cdot \left(\frac{1}{2\sqrt{x}}\right) + \frac{1}{2}(\tan x)^{-1/2} \cdot \sec^2 x$$

8. $f(x) = x^2 \sec(5x)$

$$f'(x) = (\sec(5x))(2x) + (x^2)(\sec(5x)\tan(5x) \cdot 5)$$

9. Find the equation of the tangent AND normal line at the given point

$$y = f(x) = \frac{-2}{4x-3} \text{ at } x = 3$$

pt: $(3, -2/9)$

Slope: $y' = \frac{(4x-3)(0) - (-2)(4)}{(4x-3)^2}$

$$y'(3) = \frac{8}{81}$$

tangent: $y + \frac{2}{9} = \frac{8}{81}(x-3)$

normal: $y + \frac{2}{9} = -\frac{81}{8}(x-3)$

10. Find $f''(x)$ if $f(x) = \cos(10x^2)$

$$f'(x) = -\sin(10x^2) \cdot 20x = (-20x \sin(10x^2))$$

$$f''(x) = (\sin(10x^2))(-20) + (-20x)(\cos(10x^2) \cdot 20x) = -20 \sin(10x^2) - 400x^2 \cos(10x^2)$$

12. If $f(2)=10$ and $f'(x)=x^2 f(x)$ for all x , find $f''(2)$.

$$f'' = f(x) \cdot 2x + x^2 \cdot f'(x)$$

$$f'' = f(x) \cdot 2x + x^2 \cdot (x^2 f(x))$$

$$f''(2) = f(2) \cdot 4 + 4 \cdot (4 \cdot f(2)) = 40 + 160 = 200$$

13. Prove that $\frac{d}{dx}(\cot x) = -\csc^2 x$

$$y = \cot x = \frac{\cos x}{\sin x}$$

$$y' = \frac{\sin x (-\sin x) - \cos x (\cos x)}{\sin^2 x} = \frac{-1}{\sin^2 x} = -\csc^2 x$$

14. Find 203rd derivative of $y = -\sin(x)$

$\begin{matrix} \nearrow -\sin x & \searrow \\ \cos x & -\cos x \\ \nwarrow \sin x & \nearrow \end{matrix}$

$$4 \sqrt[5]{203} \cdot 3$$

$\cos x$

15. Using the graph on the right, find $H'(4)$ if:

a. $H(x) = f(x) + g(x)$

b. $H(x) = f(x)/g(x)$

$$H'(x) = f'(x) + g'(x)$$

$$H'(4) = f'(4) + g'(4)$$

$$H'(4) = (-1) + (0)$$

$$H'(4) = -1$$

$$H'(x) = \frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}$$

$$H'(4) = \frac{(3)(-1) - (7)(0)}{(3)^2}$$

$$H'(4) = -1/3$$

