

Group Work Review for Test II

1. If $g(x) = \sqrt{11x}$ find $g'(x)$.

$$g'(x) = \left[\frac{1}{2} (11x)^{-1/2} \cdot 11 \right] = \frac{11^{-1/2}}{2} \cdot 11 \cdot x^{-1/2} = \frac{\sqrt{11}}{2\sqrt{x}}$$

2. If $y = 14x^2 - 6x - 7x^{-2}$ find y'

$$y' = 28x - 6 + 14x^{-3}$$

3. If $y = \frac{3}{x^7} - \frac{3}{x^6} + \frac{3}{x} + \sqrt{7}$ find $\frac{dy}{dx}$

$$\begin{aligned} \frac{dy}{dx} &= \left[3(-7x^{-8}) - 3(-6x^{-7}) + 3(-x^{-2}) \right] \\ &= -\frac{21}{x^8} + \frac{18}{x^7} - \frac{3}{x^2} \end{aligned}$$

4. Find all values of x where the tangent line is horizontal.

$$f'(x) = 3x^2 - 8x - 8 = 0$$

means $f'(x)$ = slope of tangent line = 0

Q-Formula:

$$f(x) = x^3 - 4x^2 - 8x + 18$$

$$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(3)(-8)}}{2(3)} = \frac{8 \pm \sqrt{64 + 96}}{6} = \frac{8 \pm \sqrt{160}}{6} = \frac{8 \pm 4\sqrt{10}}{6}$$

5. Find the point on the graph of $f(x) = x^2 + x$ where the slope of the tangent line is -3 .

$$f'(x) = 2x + 1 = -3$$

$$2x = -4$$

$$\Rightarrow x = -2$$

$$\boxed{(-2, 2)}$$

$$\boxed{\frac{4 \pm 2\sqrt{10}}{3}}$$

$$f(-2) = (-2)^2 - 2 = 4 - 2 = 2$$

6. Find $D_x y$ where $y = (8x^2 - 9)(3x^2 - 2x + 6)$.

$$\begin{aligned} D_x y &= \boxed{(16x)(3x^2 - 2x + 6) - (8x^2 - 9)(6x - 2)} \\ &= 48x^3 - 32x^2 + 96x - 48x^3 + 54x + 16x^2 - 18 \\ &= -16x^2 + 150x - 18 \end{aligned}$$

7. Find y' where $y = \frac{7x^2 + 3}{x^2 + 1}$

$$\begin{aligned} y' &= \boxed{\frac{(x^2 + 1)(14x) - (7x^2 + 3)(2x)}{(x^2 + 1)^2}} = \frac{14x^3 + 14x - 14x^3 - 6x}{(x^2 + 1)^2} \\ &= \frac{8x}{(x^2 + 1)^2} \end{aligned}$$

8. If $s(t) = 48(8t^3 - 3)^{\frac{5}{6}}$ find $s'(t)$.

$$\begin{aligned} s'(t) &= \boxed{48 \left(\frac{5}{6} (8t^3 - 3)^{-1/6} \right) (24t^2)} \\ &= \frac{960}{\sqrt[6]{8t^3 - 3}} \end{aligned}$$

9. If $y = e^{2x}(2x + 9)^9$ find $\frac{dy}{dx}$.

$$\begin{aligned} \frac{dy}{dx} &= \boxed{2e^{2x}(2x + 9)^9 + e^{2x}(9(2x + 9)^8)(2)} \\ &= 2e^{2x}(2x + 9)^8 [(2x + 9) + 9] \\ &= 2e^{2x}(2x + 9)^8 (2x + 18) \end{aligned}$$