

Math 101 - Quiz# 4

Name: Solution Serial#: _____

1. Find the point(s) where the tangent to the curve $y = \frac{2x^2}{9-x^2}$ is horizontal.

$$f'(x) = y' = \frac{(9-x^2)(4x) - (2x^2)(-2x)}{(9-x^2)^2}$$

$$= \frac{36x}{(9-x^2)^2}$$

The tangent is horizontal when $f'(x) = 0$

$$\Rightarrow \frac{36x}{(9-x^2)^2} = 0$$

$$\Rightarrow x = 0 \quad \text{The point is } (0,0).$$

2. Find $\frac{dy}{dx}$ if $y = \sqrt{\csc^3 7x}$.

$$\frac{dy}{dx} = \frac{1}{2\sqrt{\csc^3 7x}} \cdot 3\csc^2 7x (-\csc 7x \cot 7x) \cdot 7$$

$$= -\frac{21}{2} \csc^{\frac{3}{2}} 7x \cot 7x$$

$$= -\frac{21}{2} \frac{\csc^3 7x \cot 7x}{\sqrt{\csc 7x}}$$

3. Given $f(x) = x^2 g(x)$, $g(3) = 8$ and $g'(3) = 2$, find $f'(3)$.

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

$$f'(3) = 9 g'(3) + g(3) \cdot 6$$

$$= 9(2) + 8(6)$$

$$= 18 + 48 = 66$$