

## 3.2-Derivative Rules

### Derivative Rules:

If  $f$  and  $g$  are differentiable functions, then...

$$\frac{d}{dx}(x^n) =$$

$$\frac{d}{dx}(cf(x)) =$$

$$\frac{d}{dx}(f(x) \pm g(x)) =$$

$$\frac{d}{dx}(f(x) \cdot g(x)) =$$

$$\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) =$$

*Examples:*

Compute the derivative of the following:

$$f(x) = (4x^2 - 1)(7x^3 + x)$$

**Method I:**

**Method II:**

$$y = \frac{x^2 - 1}{x^4 + 1}$$

Given  $f(4) = 3$  and  $f'(4) = -5$ , find the derivative of:

$$g(x) = \sqrt{x} f(x)$$

$$h(x) = \frac{f(x)}{x}$$

Find the equation of the line tangent to  $f(x) = x^2 + x$  at the point where  $x = 2$ .

Find the slope of the line(s) tangent to the curve  $y = 1 - x^2$  which pass through the point  $(0, 2)$ .

Find the derivative of

$$g(x) = \begin{cases} x^3 - x & \text{if } x \leq -1 \\ 2x - 4 & \text{if } x > -1 \end{cases}$$

Is this function differentiable at  $x = -1$ ? Justify your answer.