

Newton's Method

Consider $x^2 - 1 = 0$

(Algorithm Fails)

* * Iteration 1 * *

① Pick value starting at $x_0 = 0$

② Get $f'(x)$

$$f'(x) = \frac{d}{dx} [x^2 - 1]$$

$$\frac{d}{dx} [x^2] - \frac{d}{dx} [1]$$

$$2x^{2-1} - 0$$

$$f'(x) = 2x$$

$$\boxed{f'(x) = 2x}$$

③ Get slope of tangent at $x = 0$

$$f'(0) = 2(0)$$

$$\boxed{f'(0) = 0}$$

④ Set equation of tangent line

$$y = mx + b \quad f'(0) = 0, m = 0$$

$$y = 0x + b$$

⑤ Get Domain and Range for $y = 0x + b$ is $(-\infty, \infty)$

⑥ Get y value and y -intercept

$$f(x) = x^2 - 1$$

$$f(0) = (0)^2 - 1$$

$$\boxed{f(0) = -1}$$

$$\downarrow$$
$$y = -1$$

Use $(0, -1)$

$$y = 0x + b$$

$$-1 = 0(0) + b$$

$$-1 = 0 + b$$

$$\boxed{-1 = b}$$

⑧ Summarize Equation

Equation of tangent line to the curve $y=f(x)$ at $x=0$ is
 $y = -1$

⑧ Find where tangent line crosses x -axis.

Tangent line do not cross main x -axis. Algorithm fails.