TOPIC: LINEARIZATION

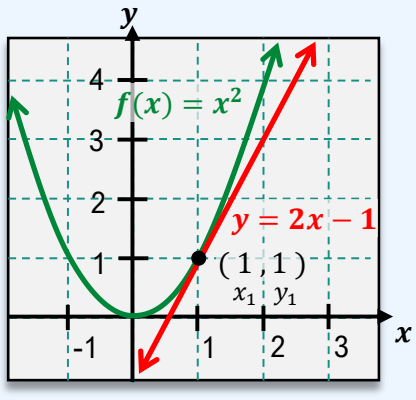
Linear Approximation

◆ If you "zoom in" closely to ***any*** smooth fcn, we can approximate it with a _____, called a **linearization**, $L(x)$.

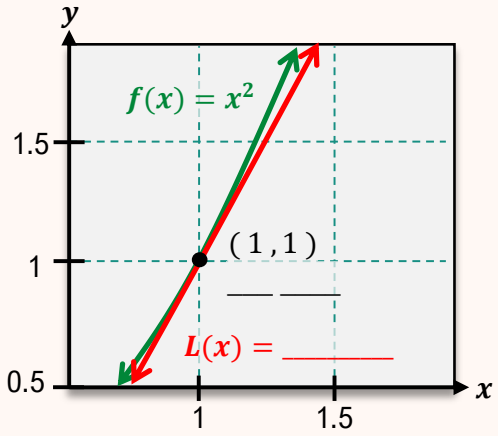
► $L(x)$ is just the tangent line of $f(x)$ at a specific value $x = a$.

EXAMPLE Find the linearization $L(x)$ of $f(x) = x^2$ at $a = 1$.

Recall **Equation of a Tangent Line**



New **Linearization**



$y \quad = \quad y_1 \; + \; m_{tan}\,(x - x_1)$

$L(x) = \_\_\_\_ + \_\_\_\_\_\ (x - \_\_\_\_)$

◆ Approximate $f(x)$ at a *specific* x-value by plugging into $L(x)$. The further it is from a, the less accurate the result.

EXAMPLE Using the function $f(x) = x^2$ and linearization $L(x) = 2x - 1$, approximate $f(1.05)$.

$f(x) \_\_\_ L(x)$

Exact value: $f(1.05) =$_____

TOPIC: LINEARIZATION

PRACTICE If $f(x) = x^3 + 1$, use the linearization $L(x)$ at $a = 5$ to approximate $f(5.1)$.

PRACTICE If $f(x) = \sqrt{x} + 12$, use the linearization $L(x)$ at $a = 16$ to approximate $f(16.01)$.