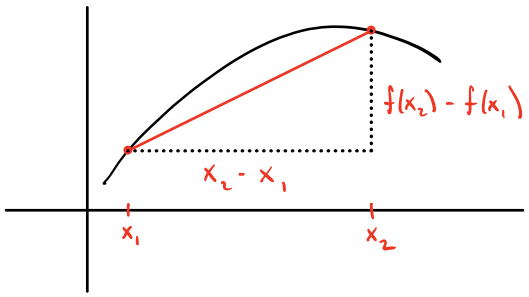
§2.1 MEASURING CHANGE

Def: THE AVERAGE RATE OF CHANGE IN $f(x)$ OVER THE INTERVAL $[x_1, x_2]$ IS

$$\frac{f(x_2) - f(x_1)}{x_2 - x_1} \quad \leftarrow \text{CHANGE IN OUTPUT} \quad \leftarrow \text{CHANGE IN INPUT}$$

GEOMETRICALLY:



AVERAGE RATE OF CHANGE = SLOPE OF SECANT LINE CONNECTING 2 POINTS ON GRAPH $y = f(x)$.

■ EXAMPLE 1 Finding an Average Rate of Change of a Function

Compute the average rate of change of the function $g(t) = 4t^2 - 3t$ over the interval $[2, 5]$.

ex. GALILEO FOUND THAT t SECONDS AFTER BEING DROPPED FROM REST, AN OBJECT WILL HAVE FALLEN A DISTANCE IN FT OF

$$s(t) = 4.9t^2.$$

ESTIMATE THE SPEED OF THE OBJECT AFTER 5 SEC. OF FREEFALL.

Time interval	Average speed (m/s)
$5 \leq t \leq 6$	53.9
$5 \leq t \leq 5.1$	49.49
$5 \leq t \leq 5.05$	49.245
$5 \leq t \leq 5.01$	49.049
$5 \leq t \leq 5.001$	49.0049