Successive Approximation in Differentiation

$y = x^2$

e.g. Find the gradient when $x = 1$ using first principles

$m = \frac{8}{2} = 4$

$m = \frac{3}{1} = 3$

$m = \frac{1.25}{0.5} = 2.5$

$m = \frac{1.25^2 - 1}{0.25} = 2.25$

The closer we get to having a tangent, the better the approximation to the gradient

$\Delta y = 8$

$\Delta y = 3$

$\Delta y = 1.5^2 - 1 = 1.25$

$\Delta x = 0.5$

$\Delta x = 1$

$\Delta x = 2$