Note: $dy \neq \Delta y$

dy is an approximation for Δy

When Δx is sufficiently small, $dy \approx \Delta y$.

Δy = actual change in the function.

$\Delta y = f(x+\Delta x) - f(x)$

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E.g. $y = f(x) = \boxed{x^3 + x^2 - 2x + 1}$

Compare the values of $\boxed{dy}$ and Δy when

(a) x changes from $\boxed{2}$ to 2.05

$dx = \Delta x = 0.05$; $f'(x) = 3x^2 + 2x - 2$.

$f'(2) = 3\cdot(2)^2 + 2\cdot 2 - 2$

$= 14$

$dy = f'(x)\,dx$

$x = 2$; $dy = f'(2)\cdot(0.05)$ dy

$dy = (14)\cdot(0.05) = \boxed{0.7}$

Δy

$\boxed{0.717625}$

$\boxed{\Delta y} = f(x+\Delta x) - f(x)$

$= f(\boxed{2.05}) - f(\boxed{2}) = \left((2.05)^3 + (2.05)^2 - 2\cdot(2.05)\right)$

-9 $+1$

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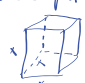
Estimate error:

Suppose the side length of a cube is measured to be $\boxed{5 \text{ cm}}$ with an accuracy of $\boxed{0.1 \text{ cm.}}$

* Use differential to estimate the error in the computed volume of the cube

$x = 5$



$-0.1 \leq dx \leq 0.1$

$V = x^3$; $dV = 3x^2\,dx$

$\boxed{V = 125}$

$dV = 3\cdot(5)^2\cdot dx = 75\cdot dx$

$\boxed{-7.5} \leq dV \leq \boxed{7.5}$

$\boxed{132.5}$

$\boxed{117.5}$

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