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ENG 281

ASSIGNMENT 3

1) $P = \frac{E^2}{R}$

$E = 200V$; $R = 8\Omega$; $\Delta E = -5V$; $\Delta R = 0.2\Omega$

$\Delta P = \frac{dP}{dE} \cdot \Delta E + \frac{dP}{dR} \cdot \Delta R$

$\frac{dP}{dE} = \frac{2E}{R}$ $\frac{dP}{dR} = \frac{-E^2}{R^2}$

$\Delta P = \frac{2(200)(-5)}{8} + -\frac{(200)}{8^2} \cdot 0.2)$

$\Delta P = -250 - 125$

$\Delta P = -375W$

Change in P is $-375W$

2) $y = \frac{KWd^4}{t^3}$

$\Delta W = \frac{3}{100} W \qquad \Delta d = \frac{2.5}{100} d \qquad \Delta t = \frac{4}{100} t$

$\frac{dy}{dw} = \frac{Kd^4}{t^3}, \quad \frac{dy}{dd} = \frac{KWd^3}{t^3}, \quad \frac{dy}{dt} = \frac{-3KWd^4}{t^4}$

$\Delta y = \frac{dy}{dw} \cdot \Delta w + \frac{dy}{dd} \cdot \Delta d + \frac{dy}{dt} \cdot \Delta t$

$\Delta y = \frac{Kd^4}{t^3} \cdot \frac{3}{100} w + \frac{4KWd^3}{t^3} \cdot \frac{2.5}{100} d - \frac{3KWd^4}{t^3} \cdot \frac{4}{100}$

$\Delta y = \frac{KWd^4}{t^3} \cdot \frac{3}{100} + \frac{KWd^4}{t^3} \cdot \frac{(2.5 \times 4)}{100} - \frac{KWd^4}{t^3} \cdot \frac{(4 \times 3)}{100}$

$\Delta y = \frac{KWd^3}{t^3} \left(\frac{3}{100} + \frac{10}{100} - \frac{12}{100} \right)$

$\Delta y = \frac{KWd^3}{t^3} \left(\frac{1}{100} \right)$

$y = \frac{KWd^4}{t^3}$

$\therefore \Delta y = \frac{1}{100} y$

$= 1\% y$

Change in $y = \pm 1\%$