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1. $P = \frac{E^2}{R}$ $E = 200V$, $R = 8$ ohms.
$\Delta P = ?$ $\delta E = 5$ volts, $\delta R = 0.2$ ohms

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

$$\frac{dP}{dE} = \frac{2E}{R}, \quad \frac{dP}{dR} = E^2R^{-1} = -\frac{E^2}{R^2}$$

$$\therefore \delta P = \frac{2E}{R}(-5) + \frac{E^2}{R^2}(0.2)$$

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

$$\delta P = -250 - 125$$
$$\delta P = -375 \text{ Watts}$$

$$y = \frac{kwd^4}{t^3} \qquad \delta w = 3\%, \ \delta d = 2\frac{1}{2}\%, \ \delta t = 4\%.$$

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

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

$$\delta y = \frac{kd^4}{t^3}\left(\frac{3}{100}\right)w + \frac{k4wd^3}{t^3}\left(\frac{2.5}{100}\right)d - \frac{k3wd^4}{t^4}\left(\frac{4}{100}\right)t$$

$$\delta y = \frac{kwd^4}{t^3}\left(\frac{3}{100} + \frac{10}{100} - \frac{12}{100}\right)$$

$$\frac{3 + 10 - 12}{100} = \frac{1}{100}$$

$$\delta y = \frac{kwd^4}{t^3}\left(\frac{1}{100}\right) = \pm 1\% \text{ of change in } y.$$

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