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

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

$dE = -5$, $dR = 0.2$, $E = 200$, $R = 8$

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

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

$= \frac{-2000}{8} - \frac{8000}{64}$

$= -250 - 125$

$dP = -375$

P decreases by 375W

② $Y = \frac{kwd^4}{t^3}$

$dw = \frac{3w}{100}$ $\quad dd = \frac{-2\frac{1}{2}d}{100}$ $\quad dt = \frac{4t}{100}$

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

$dy = \frac{dy}{dw}dw + \frac{dy}{dd}dd + \frac{dy}{dt}dt$

$= \frac{d^4w}{t^3}\left(\frac{3w}{100}\right) + \frac{4wd^3}{t^3}\left(\frac{-2\frac{1}{2}d}{100}\right) - \frac{3wd^4}{t^4}\left(\frac{4t}{100}\right)$

$= \frac{d^4w}{t^3}\left(\frac{3}{100}\right) - \frac{4wd^4}{t^3}\left(\frac{2\frac{1}{2}}{100}\right) - \frac{3wd^4}{t^3}\left(\frac{4}{100}\right)$

$= \frac{d^4w}{t^3}\left(\frac{3}{100} - \frac{10}{100} - \frac{12}{100}\right)$

$= \frac{d^4w}{t^3}\left(\frac{-19}{100}\right)$

Since $y = \frac{d^4w}{t^3}$

$= y\left(\frac{-19}{100}\right)$ = -19 percent of y

i.e y decreases by 19%