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Assignment 3

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

$$\partial P = \frac{\partial P}{\partial R} \partial R - \frac{\partial P}{\partial E} \partial E$$

$$\frac{\partial P}{\partial R} = \frac{-E^2}{R^2} = \frac{-200^2}{8^2}$$

$$\frac{\partial P}{\partial R} = -6.25$$

Also

$$\frac{\partial P}{\partial E} = \frac{2E}{R} = \frac{2(200)}{8}$$

$$\frac{\partial P}{\partial E} = \frac{400}{8} = 50$$

$$\partial E = -5 \text{ and } \partial R = 0.2$$

$$\partial P = (-6.25 \times 0.2) + (50 \times -5)$$

$$\partial P = -1.25 - 250$$

$$\partial P = -375 \text{ watts}$$

There is a decrease of 375 watts in P

$$2 \quad y = \frac{kwd^4}{t^3}$$

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

$$\frac{dy}{dw} = \frac{kd^4}{t^3}$$

$$\frac{dy}{dd} = \frac{4kwd^3}{t^3}$$

$$\frac{dy}{dt} = \frac{-3kwd^4}{t^4}$$

Also

$$\Delta w = 0.030, \quad \Delta d = 0.025d \quad \text{and} \quad \Delta t = 0.04t$$

$$\therefore dy = \frac{kd^4}{t^3} (0.030w) + \frac{4kwd^3}{t^3} (0.025d) + \left[\frac{-3kwd^4}{t^4} \times 0.04t \right]$$

$$dy = \frac{kwd^4}{t^3} (0.03) + \frac{kwd^4}{t^3} (0.1) - \frac{kwd^4}{t^3} (0.12)$$

factoring out $\frac{kwd^4}{t^3}$

$$dy = \frac{kwd^4}{t^3} [0.03 + 0.1 - 0.12]$$

$$dy = \frac{kwd^4}{t^3} (0.03)$$

Recall

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

$$dy = 0.03y$$

This shows that there is a change of 3% of y