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 Assignment

① $P = \frac{E^2}{R}$

$$\partial P = \frac{\partial P}{\partial E} \delta E + \frac{\partial P}{\partial R} \delta R$$

$$\frac{\partial P}{\partial E} = \frac{2E}{R} = \frac{2 \times 200}{8} = 50$$

$$\frac{\partial P}{\partial R} = E^2 \times R^{-1} = E^2 \times R^{-2} = \frac{-E^2}{R^2} = \frac{-200^2}{64} = \frac{-40000}{64} = -625$$

$$\delta E = -5, \delta R = 0.2$$

$$\partial P = (50)(-5) + (-625)(0.2)$$

$$\partial P = -250 - 125$$

$$\partial P = -375 \quad \therefore P \text{ decreases by } 375 \text{ watts}$$

② $Y = \frac{K w d^4}{E^3}$

$$\partial Y = \frac{\partial Y}{\partial w} \delta w + \frac{\partial Y}{\partial d} \delta d + \frac{\partial Y}{\partial E} \delta E$$

$$\frac{\partial Y}{\partial w} = \frac{d^4}{E^3}, \quad \frac{\partial Y}{\partial d} = \frac{4 w d^3}{E^3}, \quad \frac{\partial Y}{\partial E} = \frac{-3 w d^4}{E^4}$$

$$\partial Y = \frac{d^4}{E^3} \times \frac{3}{100} w + \frac{4 w d^3}{E^3} \times \frac{2.5}{100} d + \frac{-3 w d^4}{E^4} \times \frac{E}{100}$$

$$\partial Y = \frac{d^4}{E^3} \left(\frac{3}{100} - \frac{10}{100} - \frac{12}{100} \right)$$

$$\partial Y = \frac{d^4}{E^3} \left(-\frac{19}{100} \right)$$

$$\partial Y = 19\%$$

Y decreases by 19%