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16/ENG07/019
Petroleum Engineering
ENG 251 Assignment

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

$E = 200v$
$R = 8\Omega$
$\partial E = -5V$
$\partial R = 0.2\Omega$

$$\frac{\partial P}{\partial E} \times \partial E + \frac{\partial P}{\partial R} \cdot \partial R = \frac{2E\partial E}{R} + \left(\frac{-E^2}{R^2}\right)\partial R$$

$$= \frac{2 \times 200 \times -5}{8} - \left[\frac{200^2}{8^2} \times 0.2\right]$$

$$= -250 - 125$$
$$\partial P = -375kJ$$

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

$\partial w = 3\%$, $\partial d = 2\frac{1}{2}\%$, $\partial = 4\%$

$$dy = \frac{\partial y}{\partial w} dw + \frac{dy}{dd} dd + \frac{dy}{dt} dt$$

$$= \frac{kd^4}{t^3} \partial w + \frac{4kwd^3}{t^3} \partial d + \left(\frac{3kwd^4}{t^4}\right)\partial t$$

$$= \frac{kd^4}{t^3}(3w\%) + \frac{4kwd^3}{t^3}(\tfrac{5}{2}d\%) - \frac{3kwd^4}{t^4}(4t\%)$$

$$\frac{3}{100}\frac{kwd^4}{t^3} + \frac{10}{100}\frac{kwd^4}{t^3} - \frac{12kwd^4}{100t^2}$$

$$= \frac{kwd^9}{t^3}\left(\frac{3}{100} + \frac{10}{100} - \frac{12}{100}\right)$$

$$= \frac{1}{100}\frac{kwd^4}{t^3} = 1\%\cdot y$$