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16/ENG05/003
Mechatronics Engineering
ENG 281

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

$E = 200V$
$R = 8$ ohms
$\Delta E = -5V$
$\Delta R = 0.2$ ohms

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

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

$$= \frac{2E}{R} \cdot (-5V) + \frac{-E^2}{R^2} \cdot (0.2)$$

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

$$= \frac{400}{8} \cdot (-5) + \left(\frac{40,000}{64}\right) \cdot 0.2$$

$$= 50(-5) + 625(0.2)$$
$$= -250 + 125$$
$$\Delta P = -125 W$$