1) $V = 5V$

\[ P = IV \]

5k, 6k in parallel → $R_{eq} = \frac{1}{\frac{1}{6k} + \frac{1}{5k}} = 2.7k$  

$V = \frac{5V}{2.7k} = 0.87\, mA$  

V across 3k = $I\times R = 2.6\, V$  

V across 2.7k = 2.4\,V

Since 3k has $I = 0.87\, mA + V = 2.6\, V$,  

P = 2.3\, mW dissipated

5k + 6k have smaller $V$ and smaller $I$ (split $I$ in parallel)  

→ 3k dissipates most power

\[ V = \frac{5V}{2.7k} \]

2) b) $2.3\, mW < 0.25\, W$, so 1/4 W resistor is ok

2) a) Setup I: $V_i = \frac{R}{R+\frac{1}{A}}$

V measures true V, but A does not measure true I

\[ V_m = V_i - \frac{I_m R_A}{R_A + \frac{1}{A}} \]

So $V_m = I_m (R_A + \frac{1}{A}) - I_m R_A$

\[ I_m = \frac{V_i}{R_A + \frac{1}{A}} \]

\[ R_m = \frac{1}{\frac{1}{R} + \frac{1}{R_A}} \, \text{(R+R_A in parallel)} \]

c) for Setup I:

\[ \text{if } R_A = 10R, \quad R_m = \frac{1}{\frac{1}{R} + \frac{1}{10R}} = 0.9R \, (10\% \, \text{error}) \]

\[ \text{if } R_A = \infty, \quad R_m = \frac{1}{R} = 0.1R \, (0\% \, \text{error}) \]

So this setup is a problem if the voltmeter isn't ideal

Setup II: $V_i = \frac{R}{R+\frac{1}{A}}$

V doesn't measure true V  

A measures true I

\[ V_m = V_i - \frac{I_m R_A}{R_A + \frac{1}{A}} \]

\[ I_m = V_i / (R + R_A) \]

\[ R_m = R + R_A \, \text{(R+R_A in series)} \]

d) for Setup II:

\[ \text{if } R_A = 10R, \quad R_m = R \, (0\% \, \text{error}) \]

\[ \text{if } R_A = \infty, \quad R_m = 1.1R \, (10\% \, \text{error}) \]

So this setup is a problem if the ammeter isn't ideal