Hw #6 Solution keys.

$\boxed{13.2 \ \# 28}$

$$\lim_{(x,y)\to(0,0)} \frac{x^4-4y^4}{x^2+2y^2} = \lim_{(x,y)\to(0,0)} \frac{(x^2-2y^2)(x^2+2y^2)}{x^2+2y^2} = \lim_{(x,y)\to(0,0)} (x^2-2y^2) = 0$$

$\boxed{13.2 \ \# 30}$

$$\lim_{(x,y)\to(2,1)} \frac{x-y-1}{\sqrt{x-y}-1} \cdot \frac{\sqrt{x-y}+1}{\sqrt{x-y}+1} = \lim_{(x,y)\to(2,1)} \frac{(x-y-1)(\sqrt{x-y}+1)}{(x-y)-1} =$$

$$= \lim_{(x,y)\to(2,1)} (\sqrt{x-y}+1) = 2$$

$\boxed{13.2 \ \# 32}$

The limit doesn't exist because along the line $x=y$ you have:

$$\lim_{(x,y)\to(0,0)} \frac{x}{x^2-y^2} = \lim_{(x,x)\to(0,0)} \frac{x}{x^2-x^2} = \lim_{(x,x)\to(0,0)} \frac{x}{0}$$

Because the denominator is zero, the limit doesn't exist.

$\boxed{13.4 \ \# 38}$

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} \ ; \quad R = \frac{R_1 R_2}{R_1+R_2} \ ; \quad \begin{array}{l} dR_1 = \Delta R_1 = 0{,}5 \\ dR_2 = \Delta R_2 = -2 \end{array}$$

$$\Delta R \approx dR = \frac{\partial R}{\partial R_1} dR_1 + \frac{\partial R}{\partial R_2} dR_2 = \frac{R_2^2}{(R_1+R_2)^2} \Delta R_1 + \frac{R_1^2}{(R_1+R_2)^2} \Delta R_2$$

When $R_1 = 10$ and $R_2 = 15$, we have

$$\Delta R \approx \frac{15^2}{(10+15)^2}(0{,}5) + \frac{10^2}{(10+15)^2}(-2) = -0.14 \text{ ohm.}$$