

### Extra Problem 2-C Solution

$$Z = \frac{zy^2}{x^3} = 2y^2x^{-3}$$

$$\frac{\partial Z}{\partial y} = 4yx^{-3} \quad \frac{\partial Z}{\partial x} = -6y^2x^{-4}$$

$$y = 51.0$$

$$x = 4.15$$

$$\tau_y = 0.6$$

$$\tau_x = 0.12$$

$$Z = 2(51.0)^2(4.15)^{-3} = 72.78$$

$$\tau_Z^2 = \left(\frac{\partial Z}{\partial y}\right)^2 \tau_y^2 + \left(\frac{\partial Z}{\partial x}\right)^2 \tau_x^2$$

$$\frac{\partial Z}{\partial y} = 4yx^{-3} = 4(51.0)(4.15)^{-3} = 2.854$$

$$\frac{\partial Z}{\partial x} = -6y^2x^{-4} = -6(51.0)^2(4.15)^{-4} = 52.614$$

$$\tau_Z^2 = (2.854)^2(0.6)^2 + (52.614)^2(0.12)^2$$

$$\tau_Z^2 = 20.852 + \boxed{39.863} \quad \tau_Z = 7.79$$

a)  $Z = 72.8$  (WOULD BE EXCESSIVE TO WRITE  $72.78 \pm 7.79$ . IN FACT,  
 $\tau_Z = 7.8$  WOULD BE BETTER TO WRITE  $73 \pm 8$ )

b) RELATIVE ERROR =  $\frac{7.8}{72.8} \Rightarrow \underline{\underline{10.7\%}}$

c) X (TERM IN RECTANGLE ABOVE IS GREATER OF TWO CONTRIBUTING TERMS)