(3)

$V = 32{,}000$

$V = x^2 y$

$32{,}000 = x^2 y$

$$y = \frac{32{,}000}{x^2}$$

SA: $x^2 + 4xy$

$$SA = x^2 + \frac{4x}{1}\left(\frac{32{,}000}{x^2}\right) \rightarrow \frac{128{,}000x}{x^2}$$

$$SA = x^2 + \frac{128{,}000}{x}$$

$SA' = 2x - 128{,}000$

The radius of a ball bearing is measured to be .7 inch. If the measurement is correct to within 0.01 inch, estimate the propagated error in the volume of the ball bearing.

$r = .7$

$dr = \pm .01$

$$V = \frac{4}{3}\pi r^3$$

$$\frac{dV}{dr} = 4\pi r^2$$

$$dV = 4\pi r^2 dr$$

$$dV = 4\pi (.7)^2 (\pm .01)$$

$dV = \pm .06158$ cubic inches

Propagated Error = dV

$dV \quad \pm .06158 \quad \pm .06158$

Square $\Rightarrow$ 12 inch

$x = 12$

$dx = \pm\frac{1}{64}$

Area of a square

$A = x^2$

$\frac{dA}{dx} = 2x$

$dA = 2x\,dx$ $\quad dA = 2(12)\left(\pm\frac{1}{64}\right)$

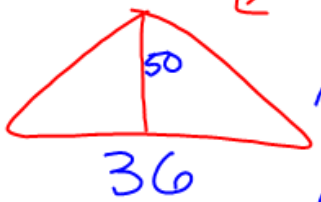
$dA = \pm\frac{3}{8} \approx \pm .375$ inches square

Relative Error:

$\frac{dA}{A} = \frac{\pm .375}{(12)^2} = \frac{\pm .375}{144} \approx \pm .0026$

Pg 240

28, 30, 31 ⟶ b) look for $\frac{dA}{A} = \frac{2x\,dx}{x^2} \leq .025$



$A = \frac{1}{2}bh \leftarrow dA = \frac{1}{2}b(dh) + \frac{1}{2}(db)h$

$db = \pm .25$

$dh = \pm .25$