

## Assignment # 3.9

$$(14) \Delta y = .78 \quad dy = .8$$

$$(16) \Delta y = -.322 \quad dy = -.32$$

$$(18) \Delta y = -.0610 \quad dy = -.061$$

$$(20) dy = \frac{2}{x^{1/3}} dx$$

$$(34) a) \pm 10.75 \text{ cm}^2$$

$$b) 1.194\%$$

## Calculus – Practice 3.9

1. a. Express the area of a square as a function of a side of length  $x$ .  $A = x^2$   
 b. Find the differential of the area function.  $dA = 2x dx$   
 c. Find the propagated error if  $x$  is measured to be 172 correct to within 2.  $688$   
 d. Find the relative error if  $x$  is measured to be 172 correct to within 2.  $2.326\%$
2. a. Express the volume of a cube as a function of a side of length  $x$ .  $V = x^3$   
 b. Find the differential of the volume function.  $dV = 3x^2 dx$   
 c. Find the propagated error if  $x$  is measured to be 172 correct to within 2.  $177504$   
 d. Find the relative error if  $x$  is measured to be 172 correct to within 2.  $3.488\%$
3. a. Express the surface area of a cube as a function of a side of length  $x$ .  $S = 6x^2$   
 b. Find the differential of the surface area function.  $dS = 12x dx$   
 c. Find the propagated error if  $x$  is measured to be 172 correct to within 2.  $4128$   
 d. Find the relative error if  $x$  is measured to be 172 correct to within 2.  $2.326\%$
4. a. Express the circumference of a circle as a function of radius of length  $x$ .  $C = 2\pi x$   
 b. Find the differential of the circumference function.  $dC = 2\pi dx$   
 c. Find the propagated error if  $x$  is measured to be 23 correct to within .5.  $3.142$   
 d. Find the relative error if  $x$  is measured to be 23 correct to within .5.  $2.174\%$
5. a. Express the area of a circle as a function of a radius of length  $x$ .  $A = \pi x^2$   
 b. Find the differential of the area function.  $dA = 2\pi x dx$   
 c. Find the propagated error if  $x$  is measured to be 23 correct to within .5.  $72.257$   
 d. Find the relative error if  $x$  is measured to be 23 correct to within .5.  $4.348\%$
6. a. Express the diagonal of a square as a function of a side of length  $x$ .  $D = x\sqrt{2}$   
 b. Find the differential of the diagonal function.  $dD = \sqrt{2} dx$   
 c. Find the propagated error if  $x$  is measured to be 107 correct to within 1.  $1.414$   
 d. Find the relative error if  $x$  is measured to be 107 correct to within 1.  $.935\%$
7. a. Express the area of a rectangle with width  $x$ , and length 10, as a function of its width  $x$ .  $A = 10x$   
 b. Find the differential of the area function.  $dA = 10 dx$   
 c. Find the propagated error if  $x$  is measured to be 107 correct to within 1.  $10$   
 d. Find the relative error if  $x$  is measured to be 107 correct to within 1.  $.935\%$
8. A box manufacturer makes cubic boxes with sides of 20 cm. If the sides might be off by as much as .015 cm, what is the maximum error possible in the volume of the box? In the surface area?  
 $18 \text{ cm}^3$  and  $3.6 \text{ cm}^2$