

Quiz 7

Math 1A, section 103

March 13, 2014

1. The radius of a circular disk is given as 24 cm with a maximum error in measurement of 0.2 cm.
 - (a) Use differentials to estimate the maximum error in the calculated area of the disk.
 - (b) What is the relative error? What is the percentage error?

a) The area is given by

$$A = \pi r^2, \quad \text{so}$$
$$dA = 2\pi r \cdot dr$$

We are given $r = 24 \text{ cm}$ and $dr \leq 0.2$, so

$$dA \leq 2 \cdot \pi \cdot 24 \cdot 0.2 \approx 30.16 \text{ cm}^2$$

b) The area for $r = 24 \text{ cm}$ is $\pi \cdot 24^2 \approx 1809.6 \text{ cm}^2$,
so the relative error is

$$\frac{dA}{A} = \frac{30.16}{1809.6} \approx 0.01666 \dots$$

Percentage error is 1.6%.