

1. Find the perimeter and area of the following objects:

- (a) **(2 pts)** a circle with a radius of 8 meters.

$$C = 2\pi r = 2 \cdot \pi \cdot 8 \text{ m} = 16\pi \text{ m} = 50.27 \text{ m}$$

$$A = \pi r^2 = \pi \cdot (8 \text{ m})^2 = 64\pi \text{ m}^2 = 201.06 \text{ m}^2.$$

- (b) **(2 pts)** a square with a length of 12 feet.

$$P = 4 \cdot l = 4 \cdot 12 \text{ ft} = 48 \text{ ft}.$$

$$A = l^2 = (12 \text{ ft})^2 = 144 \text{ ft}^2.$$

2. A competitive swimming pool is 50 meters long, 30 meters wide, and 2.5 meters deep.

- (a) **(2 pts)** How much water does it hold (in cubic meters)?

$$V = l \cdot w \cdot h = 50 \text{ m} \cdot 30 \text{ m} \cdot 2.5 \text{ m} = 3,750 \text{ m}^3.$$

- (b) **(2 pts)** What is this in cubic feet? (1 meter = 3.28 feet.)

$$1 \text{ m} = 3.28 \text{ ft} \Rightarrow (1 \text{ m})^3 = (3.28 \text{ ft})^3 \Rightarrow 1 \text{ m}^3 = 35.29 \text{ ft}^3.$$

And so

$$V = 3,750 \text{ m}^3 \cdot \frac{35.29 \text{ ft}^3}{1 \text{ m}^3} = 132,337 \text{ ft}^3.$$

3. Create an exponential function of the form $Q = Q_0 \cdot (1 + r)^t$ in part (a), and then use it to answer the question in part (b).

- (a) **(2 pts)** The population of a town with an initial population of 66,000 has been growing with a rate of 3.4%.

$$Q = Q_0 \cdot (1 + r)^t = 66,000 \cdot (1 + 0.034)^t = 66,000 \cdot 1.034^t.$$

- (b) **(2 pts)** What is the population going to be in 17 years?

$$Q = 66,000 \cdot 1.034^{17} = 116,518.$$

4. **(4 pts)** If prices increase at a monthly rate of 1.8%, by what percentage do they increase in a year?

If an item costs \$100 now, it will cost $\$100(1+0.018)^{12} = \123.90 in 1 year – an increase of 23.9%.

- (b) **(Extra Credit: 2 pts)** If an item costs \$10 now, what will its price be in 2 years?

$$\$10 \cdot (1 + 0.018)^{2 \cdot 12} = \$15.34.$$