

Before we begin, are there any questions from last day's work?

Worksheet 1.3.3

Today's Learning Goal(s):

By the end of the class, I will be able to:

- a) solve problems involving exponential equations graphically, including problems arising from real-world context.
- b) use graphing technology to find the x -value of an exponential function, for a given value of the function.

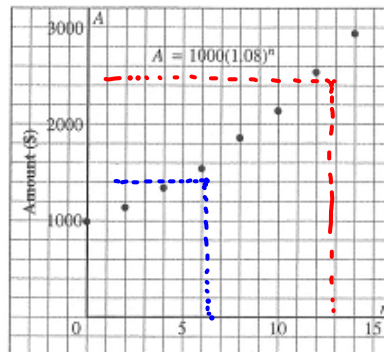
1.4.1: Applications of Exponential Functions

Date: Feb. 12/18

Ex. 1 Suppose you invest \$1000 at 8% per year, compounded annually. The amount, A dollars, of your investment after n years is represented by the equation $A = 1000(1.08)^n$

Using the graph:

- a) Estimate the value of the investment after 5 years.
- b) Estimate how many years it takes for the investment to grow to \$2500.
- c) Describe how both the graph and the equation change in each case.
 - i) The original investment is greater than, or less than, \$1000.
 - ii) The interest rate is greater than, or less than, 8%.



- a) \$1400
- b) 11.2 years

Ex. 2 Suppose you invest \$1000 at 8% per year, compounded quarterly.

- a) Write an exponential function to model this.
- b) Estimate the value of the investment after 3 years.
- c) Estimate how many years it takes for the investment to grow to \$2800.

a) $A = ?$ $A = 1000\left(1 + \frac{0.08}{4}\right)^{4x}$ c) $A = 2800$

$P = 1000$
 $i = \frac{0.08}{4}$
 $n = 4x$

b) if $x = 3$
 $A = 1000\left(1 + \frac{0.08}{4}\right)^{12}$
 $= 1268.241$
 $= \$1268.24$

$\therefore 2800 = 1000\left(1 + \frac{0.08}{4}\right)^{4x}$
 $y_1 = 1000\left(1 + 0.08 \div 4\right)^{4x}$
 $y_2 = 2800$
 $\therefore x = 12.998$
 \therefore it takes about 13 years.

Ex. 3 A tire with a slow puncture loses pressure at the rate of 4%/min. The tire's initial pressure is 300 kPa.

a) Write an exponential function to model this.

$$a) P = P_0(1 \pm r)^n \quad y = ab^x$$

$$= 300(1 - 0.04)^n$$

$$= 300(0.96)^n$$

b) What is the tire's pressure after: i) 1 min?

ii) 2 min?

iii) 10 min?

$$b) i) P = 300(0.96)^1$$

$$= 288 \text{ kPa}$$

$$ii) P = 300(0.96)^2$$

$$= 276.48 \text{ kPa}$$

$$iii) P = 300(0.96)^{10}$$

$$\approx 199.449$$

$$\approx 199.45 \text{ kPa}$$

c) Use graphing technology to determine when

the tire's pressure will be i) 160 kPa

ii) 120 kPa

$$y_1 = 300(0.96)^x$$

$$i) y_2 = 160$$

$$ii) y_3 = 120$$

$$x \approx 15.39$$

$$\therefore \text{about } 15.4 \text{ min}$$

$$\therefore x \approx 22.45$$

$$[22 \text{ min}, 27 \text{ sec}]$$

$$\begin{array}{r} 0.398 \\ \times 60 \\ \hline \approx 24 \text{ sec} \end{array} \rightarrow$$

$$[15 \text{ min}, 24 \text{ sec}]$$

Review the learning goals. Were we successful today?

Homework: 1.4.1

Read pp.326-328

pp. 329-331 # 7, 11, 2, 4, 5

Extra Practice p.330 # 9, 10