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.

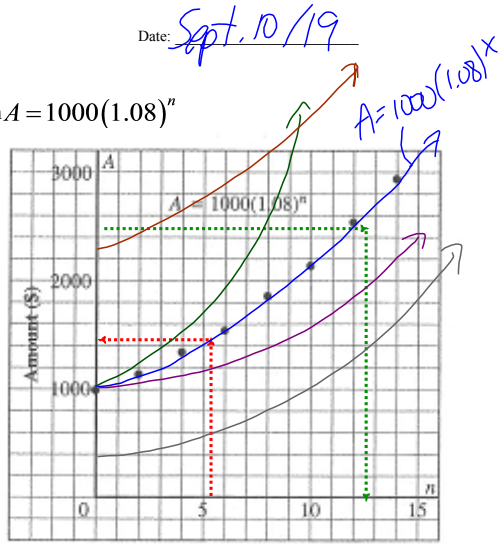
1.4.1: Applications of Exponential Functions

Date: Sept. 10/19

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) from the graph, about $1420

b) " , 12.2 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.

(*See desmos Ex.*)

a) $A = y$, $P = 1000$, $i = \frac{0.08}{4}$, $n = 4x$

$y = 1000\left(1 + \frac{0.08}{4}\right)^{4x}$

$= 1000(1.02)^{4x}$

b) if $x = 3$

$y = 1000(1.02)^{4(3)}$

$= 1000(1.02)^{12}$

$\doteq 1268.241$

$\doteq \$1268.24$

c) $2800 = 1000(1.02)^{4x}$

$\frac{2800}{1000} = \frac{1000}{1000}(1.02)^{4x}$

$2.8 = 1.02^{4x}$

↳ Very tedious to do by estimating.

↳ Using desmos, $x = 12.999$

$\therefore$ 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.

$y = 300(0.96)^t$

b) What is the tire's pressure after: i) 1 min?
ii) 2 min?
iii) 10 min?

b i) $t = 1$
$y = 300(0.96)^1$
$= 288$ kPa

b ii) $t = 2$
$y = 300(0.96)^2$
$= 276.48$ kPa

b iii) $t = 10$
$y = 300(0.96)^{10}$
$\doteq 199.45$ kPa

$P = P_0(1 \pm r)^n$

$100\% + 4\% = 104\% = 1.04$ | $1 + 0.04 = 1.04$

$100\% - 4\% = 96\% = 0.96$ | $1 - 0.04 = 0.96$

c) Use graphing technology to determine when the tire's pressure will be i) 160 kPa
ii) 120 kPa

c i) $y = 160$

$160 = 300(0.96)^t$

$\frac{160}{300} = 0.96^t$

$\frac{8}{15} = 0.96^t$

$t \doteq 15.399$

Read pp.326-328, then complete p.329 #7,11,2,4,5 Extra practice: p.330 #9,10

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

Answer any remaining homework questions

Students ask for "at desk" clarification.