

### Unit 5, Lesson 7: Modelling Data with Functions

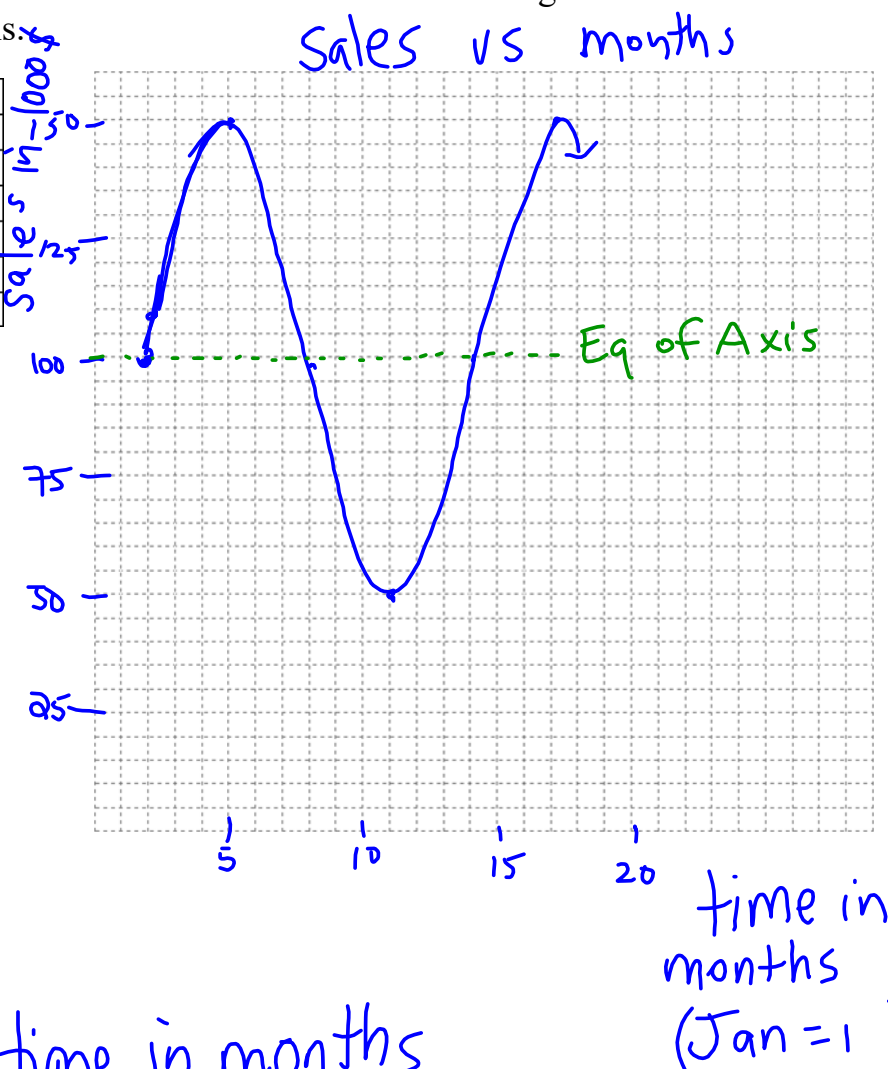
Regression is the process of determining the equation of a curve of best fit for a set of data. They are useful for modelling data that has been gathered to predict future behaviour.

To perform a regression by hand:

- Graph the data & draw a curve of best fit
  - pay attention to your scale; make it consistent and fitting to the data
- Determine the parent function
  - look at the shape of the curve
  - consider past and future behaviour
- Decide which transformations you need
  - the fewer, the better!
  - some transformations you can determine looking at the curve, others need algebra
- Choose 1 (or more) point(s) to substitute into your equation to solve for the parameters needed.
  - in general, the more parameters you are solving for, the more points you will need – you may end up with a system of equations.

Ex 1) The data for sales of a seasonal product are collected. Results are shown in the table below. Graph the data and determine the model that gives the sales as a function of time in months.

Month	Sales (\$1000)
2 Feb	101
5 May	150
8 Aug	98
11 Nov	50
14 Feb	100
17 May	147



$$|a| = 50$$

$$c = 100$$

$$\text{period} = 12$$

$$K = \frac{360}{12}$$

$$K = 30$$

$$d = +2$$

Let  $t$  be time in months

Let  $S$  be sales.

$$S(t) = 50 \sin[30(t-2)] + 100$$

For exponential regression, you need to determine both the base of the parent function, as well as any transformations you need. Determining the base should be your first step!

Ex 2) The Consumer Price Index is a measure of the cost of living. It is found by tracking the average family's typical living expenses. An upward trend in CPI is called inflation. The table gives the CPI for Canadians over a 7-year period.

a) Graph the data and determine the model that gives the CPI as a function of time in years.

Year	CPI (\$)
2002	100
2003	102.9
2004	105.9
2005	109
2006	112.1
2007	115.4
2008	118.8

1st ratio

1.029

1.029

1.029

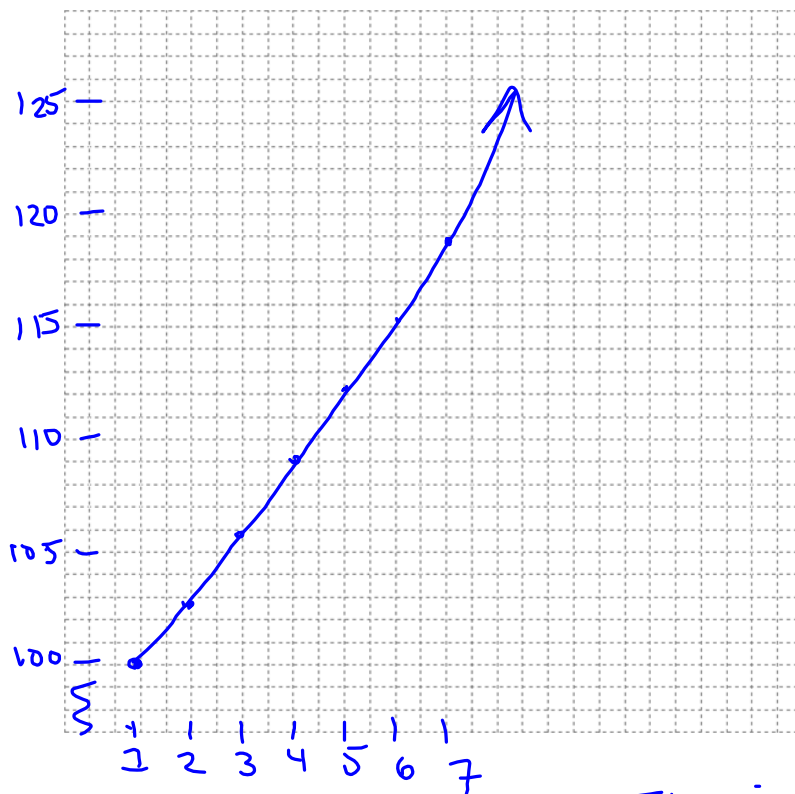
1.029

1.029

1.029

Parent:

$$f(x) = 1.029^x$$



$$g(x) = 100(1.029)^x$$

Time in  
years since  
2002

b) What would be the CPI for the year

i) 2016? → 14 years since 2002.

$$g(14) = 100(1.029)^{14}$$

$$g(14) = 149.22 \$$$

ii) 1990?

↳ 12 years before

$$g(-12) = 100(1.029)^{-12}$$

$$= 70.96 \$$$

HW : p. 392 # 5 , 8, 9, 10

↓  
wrong  
answers

handout PART A : 1, 2, 4  
PART B : 1, 5, 6