

Math 1030 #14b

Linear Modeling

The Equation of a Line

You begin the year with 25 songs on your playlist and add 6 songs each month. A way to express how many songs you will have in any future month is

$$\text{number of songs} = 25 \text{ songs} + (6 \text{ songs / month})(\# \text{ of months})$$

If we let N = the number of songs and t = time in months,

$$N = 25 + 6t$$

This gives us a general equation for a linear function:

$$\text{dependent variable} = \text{initial value} + (\text{rate of change})(\text{independent variable})$$

or

$y = b + mx$, where m is the slope (rate of change) and b is the initial value.

We generally write it this way: $y = mx + b$

How to write the equation of a line

Let x = the independent variable

y = the dependent variable

Step 1: Determine the slope (rate of change) of the line.

$$m = \frac{\text{change in } x}{\text{change in } y} = \frac{y_2 - y_1}{x_2 - x_1}$$

Step 2: To find the initial value, substitute m , x and y into the equation and solve for b .

Step 3: Write the equation, $y = mx + b$, using the values found above.

EX 1:

Write an equation for the line which contains these points:
(3,5) and (6,14)

EX 3:

Two astronauts on an outer space mission love dehydrated astronaut ice cream sandwiches. This table shows how many sandwiches are left on any given day of the mission, starting with the beginning of the trip.

t	1	3	6	10
Q	96	88	76	60

t = no. of days they've been on the mission

Q = number of sandwiches left

- a) Write a linear equation for this data.
- b) On what day of the mission will there be only 4 sandwiches left?