

# 1.2 Linear Functions & Regression

## NOTES

### Pre-Calculus

Write your questions here!

$y = mx + b$   
Slope Intercept Form  
Ex Graph line through points  
(4, -10), (-12, 2)

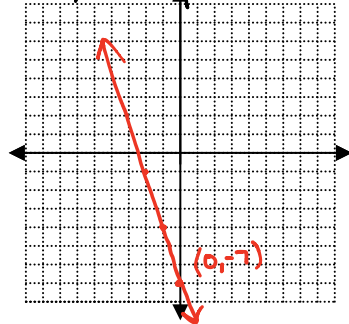
$$m = \frac{\Delta y}{\Delta x} = \frac{(-10) - (2)}{(4) - (-12)} = \frac{-12}{16} = -\frac{3}{4}$$

$$y - y_1 = m(x - x_1)$$

$$y - (-10) = -\frac{3}{4}(x - 4)$$

$$y + 10 = -\frac{3}{4}x + 3$$

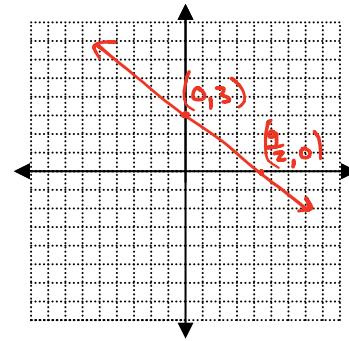
$$y = -\frac{3}{4}x - 7$$



$Ax + By = C$   
Standard Form  
Ex. Graph  $2x + 3y = 9$

$$x\text{-int: } 2x + 3(0) = 9 \Rightarrow 2x = 9 \Rightarrow x = \frac{9}{2}$$

$$y\text{-int: } 2(0) + 3y = 9 \Rightarrow 3y = 9 \Rightarrow y = 3$$



$y - y_1 = m(x - x_1)$   
Point Slope Form  
Ex Write equation through points  
(4, -10), (-12, 2)

$$m = \frac{\Delta y}{\Delta x} = \frac{(-10) - (2)}{(4) - (-12)} = \frac{-12}{16} = -\frac{3}{4}$$

$$y - y_1 = m(x - x_1)$$

$$y - (-10) = -\frac{3}{4}(x - 4)$$

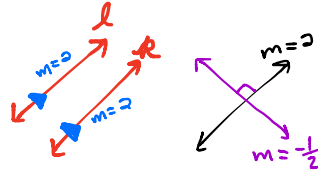
Point-slope

$$y - y_1 = m(x - x_1)$$

$$y - (-10) = -\frac{3}{4}(x - 4)$$

### Parallel and Perpendicular

Write the equation of the line that is perpendicular to  $y = -\frac{2}{3}x + 5$  and contains (4,5)



Point	Slope	Point-Slope
(4,5)	$m = -\frac{2}{3}$ $\perp m = \frac{3}{2}$	$y - y_1 = m(x - x_1)$ $y - (5) = \frac{3}{2}[x - (4)]$ $y - 5 = \frac{3}{2}x - 6$ $y = \frac{3}{2}x - 1$

### Regression

Sandwich	Total Fat (g)	Total Calories
Hamburger	9	260
Cheeseburger	13	320
Quarter Pounder	21	420
Quarter Pounder with Cheese	30	530
Big Mac	31	560
Arch Sandwich Special	31	550
Arch Special with Bacon	34	590
Crispy Chicken	25	500
Fish Fillet	28	560
Grilled Chicken	20	440
Grilled Chicken Light	5	300

Predict the calories of the Grilled Cheese Burger that has 79 grams of fat.  $1120.6$

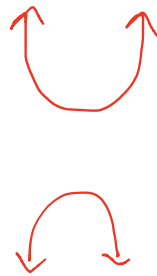
Predict the fat grams of 800 calorie sandwich.

$51.669$  fat grams



## Quick Review of Graphs

Quadratic



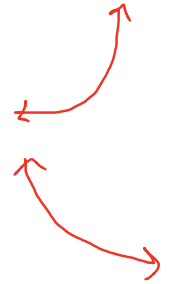
Square Root



Cubic

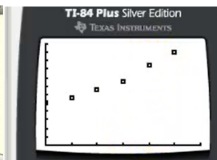
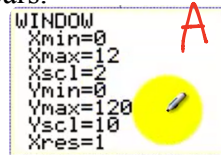


Exponential

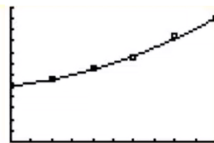
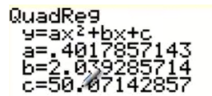


The table below lists the number of Americans (in thousands) who are expected to be over 100 years old for selected years.

Year	Number (thousands)
1994	50
1996	56
1998	65
2000	75
2002	94
2004	110



$x = \text{year}$   
 $y = \text{Americans thousands}$



1. Find the “friendly” window to view the scatterplot. **A**
2. Determine the function that best represents the data. **QUADRATIC**
3. Use regression to create a model.  $y =$   

$$y = .40x^2 + 2.039x + 50.071$$
4. Predict the number of 100 year old Americans in 2010.  

$$185.557 \text{ thousand} \Rightarrow 185,557 \text{ one hundred year olds.}$$
5. Predict when will there be 80,000 one hundred year old Americans?

$$6.458 \Rightarrow 2000.458$$

### SUMMARY:

Now,  
summarize  
your notes  
here!

