Discrete vs. Continuous Functions

In the function f(x) = mx + b

The independent variable = x (we choose it) ***Dependent variable = f(x) (we find it)***

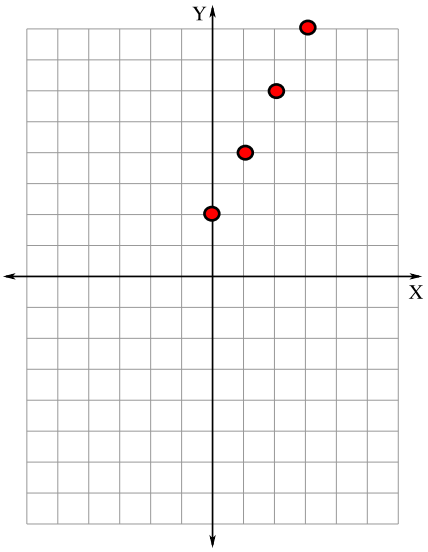
Reason: the value of f(x) depends on the x we choose

Definitions:
Continuous function: y's exist for all real x-values (connect points with a continuous line)

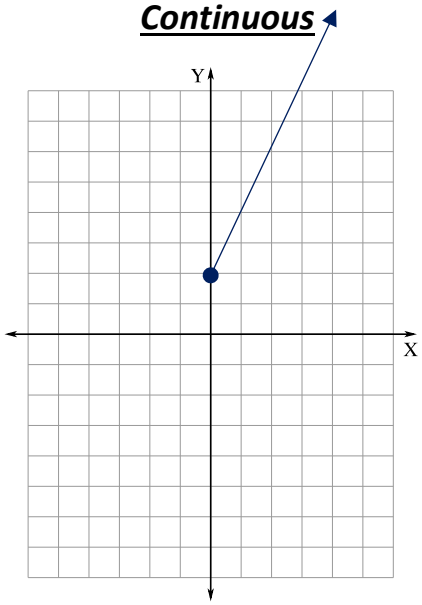
Discrete Relation: only whole # x's exist … so points cannot be connected by a line

Examples shown below

Discrete



Continuous



Stating the domain and range of a discrete function

Since only whole # values exist: ***Domain:*** ***{0, 1, 2, 3, 4 …}***

Seems like this function starts at 0

Range: ***{2, 4, 6, 8, 10 ,…}***

If the domain and range don't continue to ∞, then you indicate largest value in domain and range.

Example: Cost of a pizza: c(t) = 1.5t + 12.50 (maximum of 10 toppings)

Creates the table

toppings	0	1	2	3	4 ….	10 max
Cost:	12.50	14	15.50	17	18.50	27.50

Domain: ***{0, 1, ,2, …. 10}*** ***Range:*** ***{12.5, 14, 15.5, …. 27.50}***

(Why no negative x's?) ***Can't have negative # of topping – 0 topping cheese pizza is smallest***

Would the following be discrete or continuous?

Cost to host a banquet per guest coming? since per guest = Discrete

Temperature of a hot coffee vs time? Temperature drops continuously

Height of a sunflower as it grows? Growth is continuous but a max and min exist

#of cookies in a cookie jar vs time? Per cookie = discrete

Sketching functions

When the domain is any real #
Use your graphing rules

a) $f(x) = \frac{2}{3}x + 5$ *b)* $g(x) = \frac{-1}{4}x - 6$

y-int = 5, m = 2/3 *y int = -6, m = - ¼*

What if we fix the domain?
For example - if x represents time, or people

- *Can't have neg x's, line has a starting point*

c) $f(x) = -2x + 1, \quad x \geq 0$

y int = 1, m = -2 but starts at x = 0

d) $f(x) = \frac{2}{5}x - 3, \quad x > 0$

y int = -3, m = 2/5 but starts at x = 0 (hollow)

Sketching Discrete Functions
Banquet Hall + Guests
Formula: C(t) = 15x + 250 max 75 people

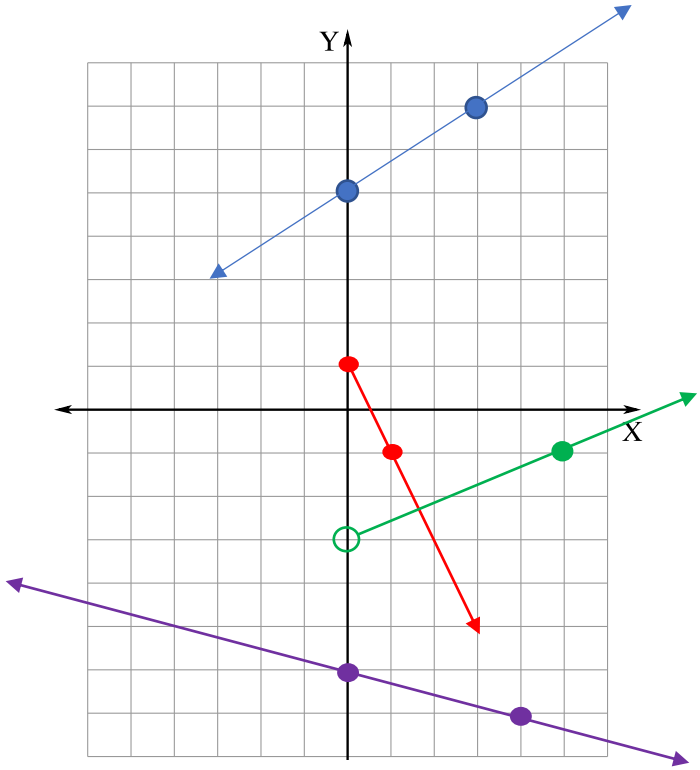
- *y-int = 250, m = 15 (can't have negatives)*
- *the squiggle …. Allows me to not start at (0,0)*

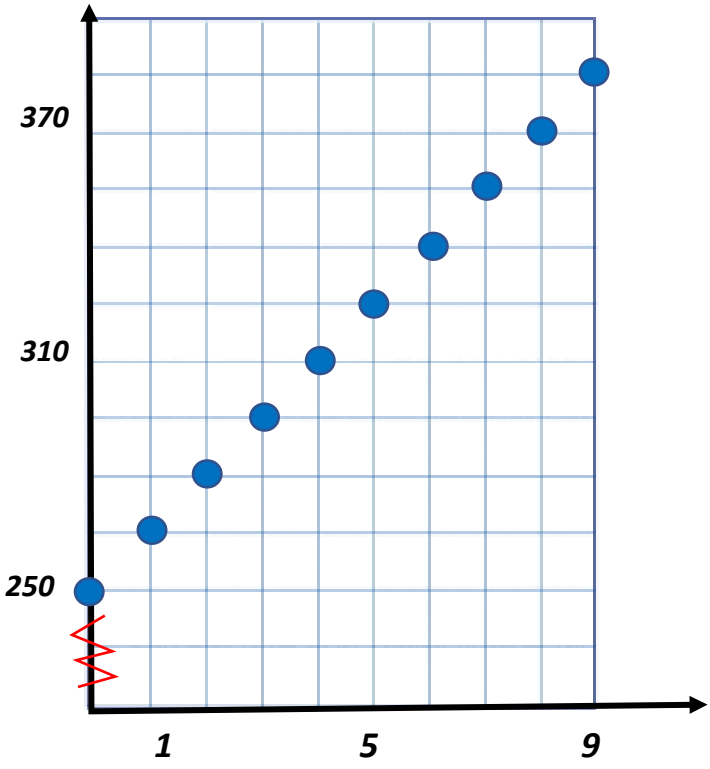
If the max number of people is 75,
state the domain and range

D: {0, 1, ,2, ,3, …, 75}

R: {250, 265, 280, …, 1375}

Assignment = worksheet





Sketching Functions - Continuous and Discrete

1) Sketch the 5 functions on the axis - the domain and range are all real numbers

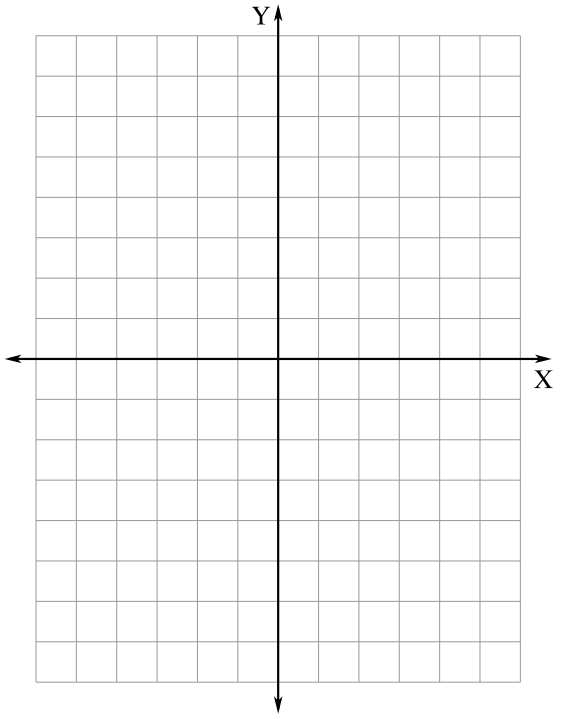
a) $f(x) = 3x - 2$

b) $g(x) = 4x + 1$

c) $h(x) = \frac{3}{4}x - 7$

d) $m(x) = \frac{-1}{5}x + 3$

e) $q(x) = \frac{-1}{6}x$



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2) Using the fixed domains, sketch the 5 functions on the axis provided.

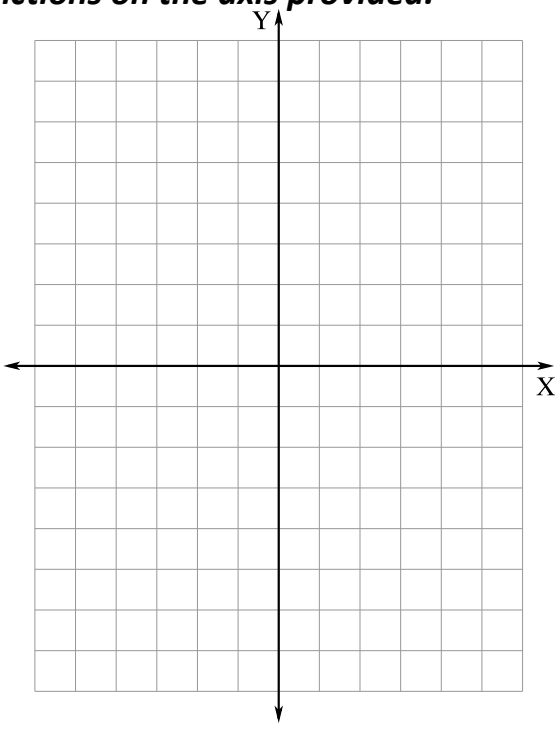
a) $f(x) = 2x - 3, \quad x \geq 0$

b) $g(x) = -5x + 6, \quad x > 0$

c) $h(x) = \frac{3}{4}x - 5, \quad x > 0$

d) $n(x) = 3x - 8, \quad x \geq 2$

e) $p(x) = \frac{1}{3}x + 4, \quad x > 3$



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3) Determine if the following are discrete (D) or continuous (C)

a) temperature of a beaker of liquid vs time _____ ***b) height on a Ferris wheel vs time ____***

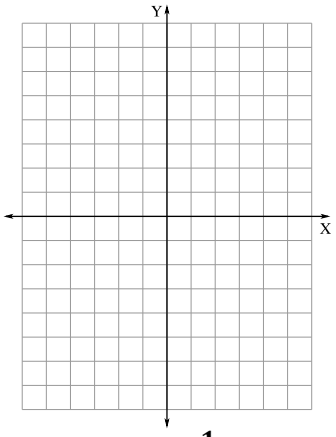
c) graphing money won vs tickets bought ___ ***d) your paychecks vs hours worked ____***

e) *bean length vs # of individuals ___*

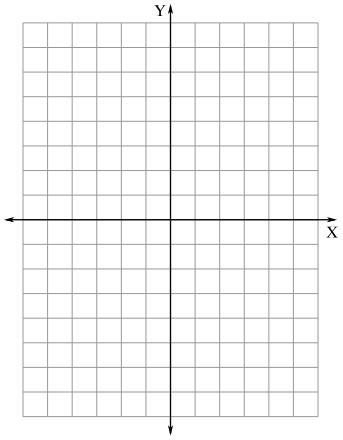
f) *cost to rent a plumber if they charge for each ¼ hour ____*

4) Plot the following DISCRETE functions for {0, 1, 2,3, 4} (Scale axis if needed)

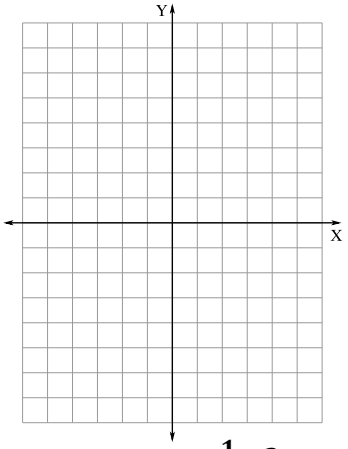
a) f(x) = 2x - 6



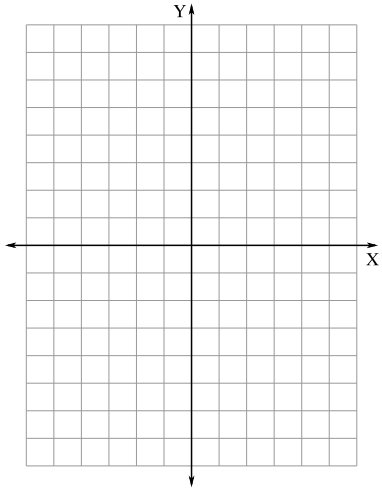
b) g(x) = -x + 7



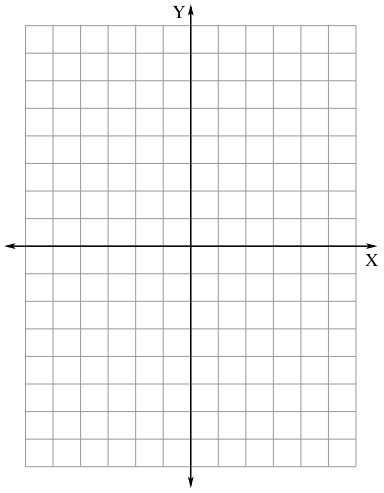
c) h(x) = 10x - 25



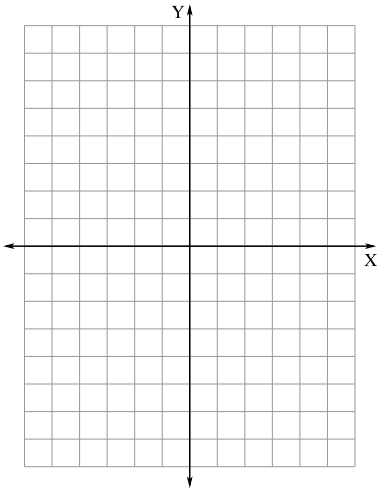
d) $p(x) = \frac{1}{2}x + 2$



e) t(x) = -20x + 80



f) $k(x) = \frac{1}{2}x^2$



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4a) D:

R:

b) D:

R:

c) D:

R:

10a) ***b)*** ***c)*** ***d)***

12a) ***b)***

13a) ***b)*** ***c)***