

Section 1.3 Functions + Relations.

ALEKS HW

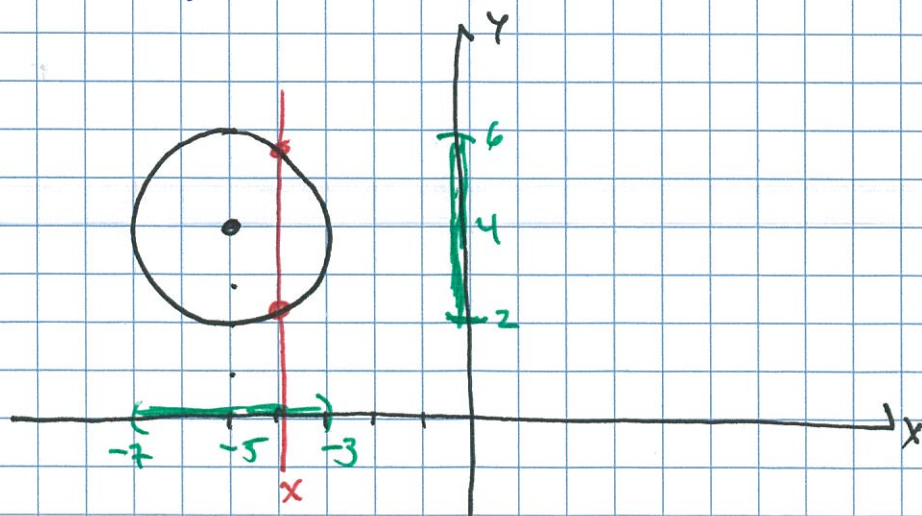
- Relationships
 - Functions
 - def of a relationship is a fcn
 - Function notation
 - x, y intercepts
 - domain + range
-

Equations define relationships between variables
A variable is a quantity whose value can take on any number within a set of possible values.

ex/ $y^2 + 10y + x^2 - 8x + 37 = 0$

is a circle of radius 2 centered @ $(-5, 4)$
(you should be able to show this)

x can take on
any value between
-7 and -3.



Given x you can find one or two
possible y values associated w/ the x value.

①

Special case - If you give me one value of x and there is only one possible value of y , we say that the relationship is a function.

or " y is a function of x "

ex/ If you give me (?) then I return —

give "a" return "c"

give "b" return "d"

give "c" return "e"

⋮

or

a b c d...
↓ ↓ ↓ ↓
c d e f...

or

x	a	b	c	d...
y	c	d	e	f...

call it a "caesar cypher"

ex/

x	y
1	4
2	#
3	•
4	^

so $f(z) = \#$

ex/

$$y = 2x + 1$$

when $-1 \leq x \leq 2$.

"give x mult. by 2 then add 1"
only if x is between
-1 and 2 inclusive.

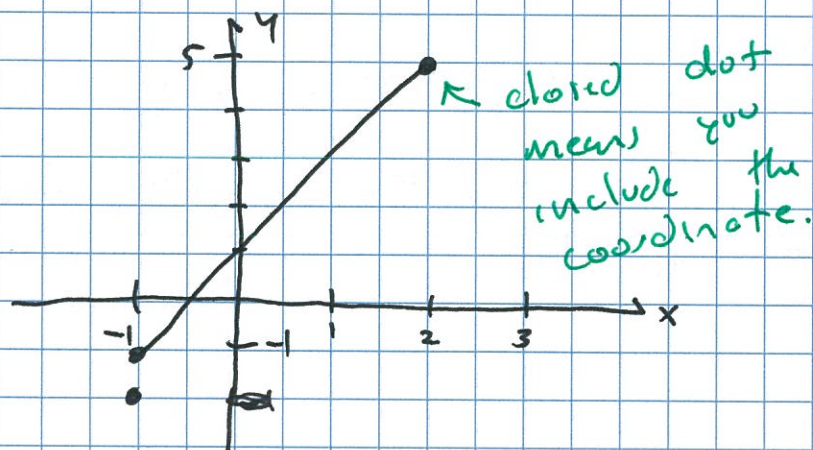
A function can be a rule to give an output based on an input.

(2)

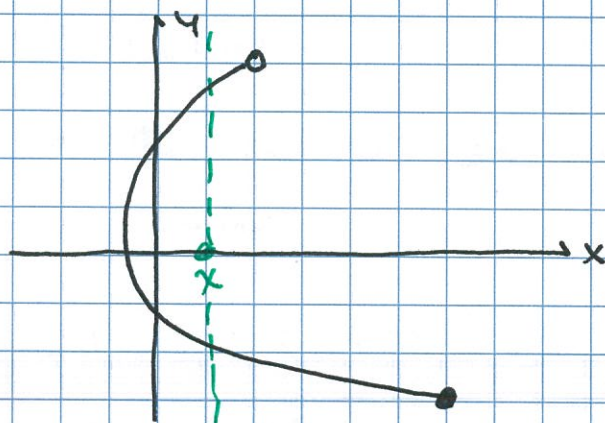
so, if $x = 1/2$
 $y = 2 \cdot \frac{1}{2} + 1 = 2,$

$x = 1/4$
 $y = 2 \cdot \frac{1}{4} + 1 = 3/2.$

Important - given x there is only one y
 graphically



ex/



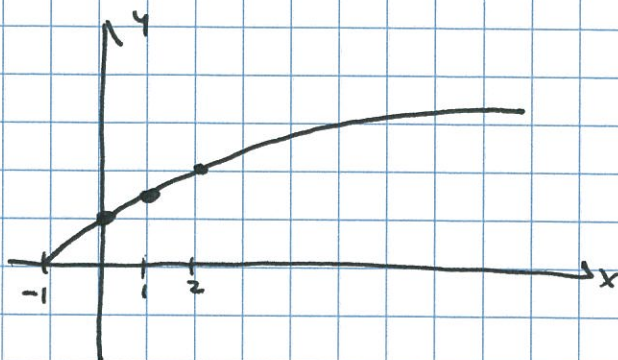
is this a
 function?

I can find at least one x
 when there are two values
 of y .

Not a function.

ex/ $bob(x) = \sqrt{x+1}$

x	bob
-2	???
-1	0
0	1
1	$\sqrt{2}$
2	$\sqrt{3}$



what? only make sense if

$\sqrt{(\cdot)}$ exists.

↑ has to be positive or zero.

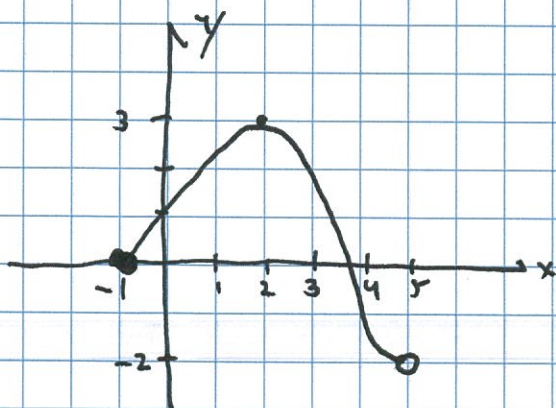
$$x+1 \geq 0$$

$$x \geq -1$$

domain: $[-1, \infty)$

range: $[0, \infty)$

ex/



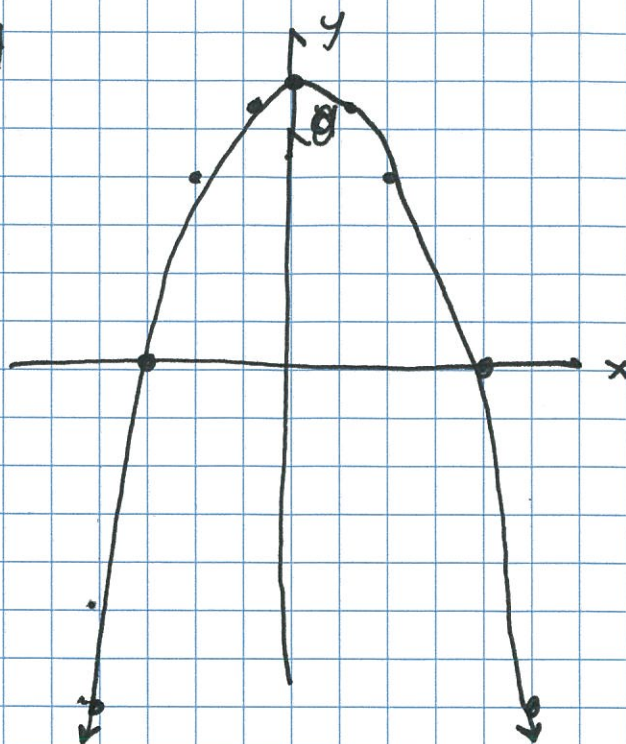
domain: $[-1, 5)$

range: $[-2, 3]$

Time Permitting

ex/ $y = 9 - x^2$

x	y
-4	-7
-3	0
-2	5
-1	8
0	9
1	8
2	5
3	0
4	-7



domain: $-\infty < x < \infty$ or $(-\infty, \infty)$

range: $-\infty < y \leq 9$ or $(-\infty, 9]$

note it has intercepts!

x-intercepts

$$y = 0 \Rightarrow 0 = 9 - x^2$$

$$x^2 = 9$$

$$x = \pm\sqrt{9} = \pm 3$$

x-intercepts @ $(3, 0)$ and $(-3, 0)$

y-intercept

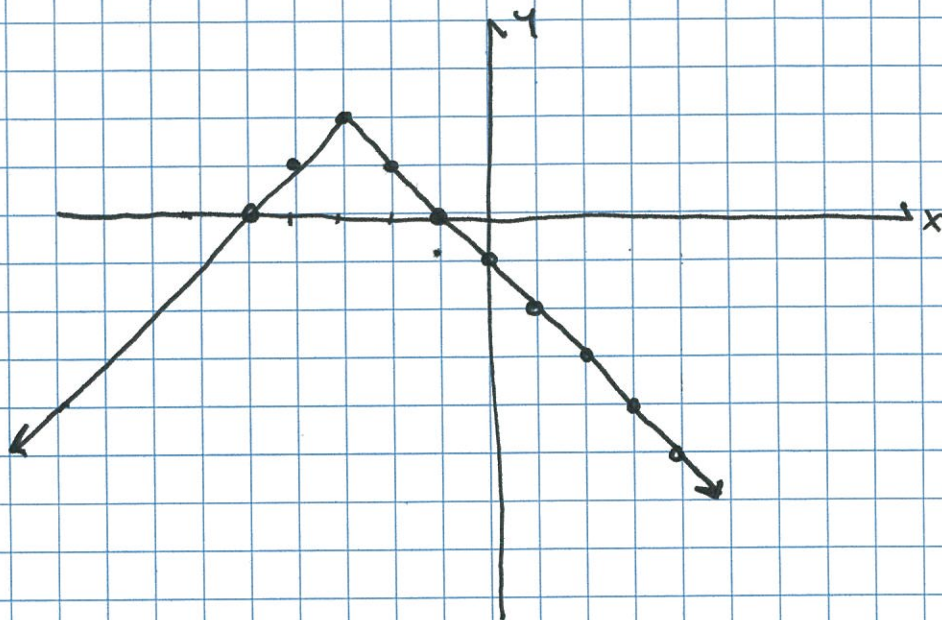
$$x = 0 \Rightarrow y = 9 - 0^2 = 9$$

y-intercept @ $(0, 9)$

ex/ brenda (x) = ~~$x+3$~~ $2 - |x+3|$

Time Permits

x	y
-4	1
-3	2
-2	1
-1	0
0	-1
1	-2
2	-3
3	-4
4	-5
-5	0
-6	-1
⋮	



domain: $(-\infty, \infty)$ or $-\infty < x < \infty$

range: $(-\infty, 2]$ or $-\infty < y \leq 2$

x-intercept: $y = 0$ $0 = 2 - |x+3|$

$|x+3| = 2$

$x+3=2$ or $x+3=-2$
 $x=-1$ $x=-5$

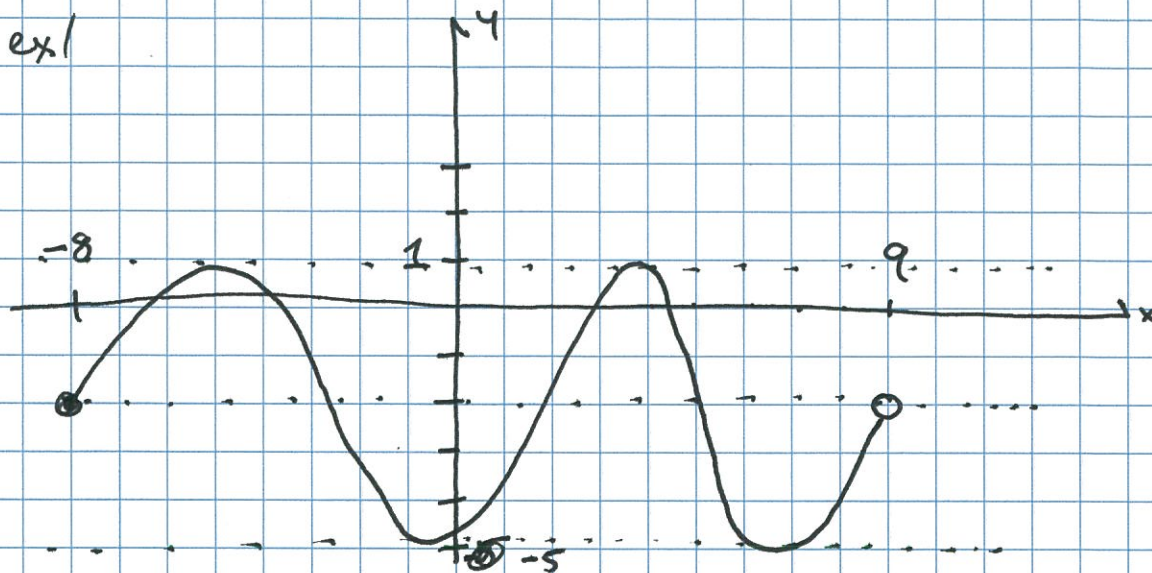
$(-1, 0)$ and $(-5, 0)$

y-intercept: $x=0$

$y = 2 - |0+3| = -1$
 $(0, -1)$

Time Permitting

ex 1



domain: $[-8, 9)$ or $-8 \leq x < 9$

range: $[-5, 1]$ or $-5 \leq y \leq 1$