1/22 TUE

1.2 Basics of Functions & Their Graphs

set notation $\{\ldots\}$

Domain - set of x-values
Range - set of y-values
x, y

ex 1) Find domain & range: $\{(8,-7),(-6,-3),(5,-2),(5,-9)\}$

→ d: $\{8,-6,5,\cancel{5}\}$ → $\{-6,5,8\}$

→ r: $\{-7,-3,-2,-9\}$ → $\{-9,-7,-3,-2\}$

Function: "x-value has a unique y-value"

ex 2a) $\{(-2,-2),(1,7),(5,7),(8,-5),(10,3)\}$

→ is a function!

b) $\{(2,3),(2,-8),(6,-3),(8,-4),(10,-7)\}$

→ is not a function! $2 \to 3, -8$ ☹

c) $\{(3,7),(4,7),(5,7),(6,7)\}$

→ is a function!

Functions / Equations

→ solve for y

ex 3a) $x+y=81$

$-x \quad -x$

$y=-x+81$

→ linear $y=mx+b$

→ Function!

b) $x+y^2=1$

$-x \quad -x$

even root

$y^2=-x+1$

$\pm\sqrt{}$

$y=\pm\sqrt{-x+1}$

GC

→ not a function

Functions

c) $xy+9y=1$

factor out a y

$y(x+9)=1$

$(x+9) \quad (x+9)$

$y=\frac{1}{x+9}$

→ is a function

d) $x+y^3=27$

$-x \quad -x$

odd root

$y^3=-x+27$

$\sqrt[3]{}$

$y=\sqrt[3]{-x+27}$

$\sqrt[3]{-(x-27)}$

horiz refl. right 27

Function notation

$f(x)$ replaces y.

$f(x)$

x

ex 4) $f(x) = -3x - 8$. Find $f(-2)$. ← x-value

find y when $x = -2$ → $(x, f(x))$ → $(-2, -2)$

$f(-2) = -3(-2) - 8 = 6 - 8 = -2$

ex 5) $f(x) = x^2 + 3$. Find $f(x+4)$ → composition of functions → $f \circ g$

$f(x+4) = (x+4)^2 + 3$

$= (x+4)(x+4) + 3 = x^2 + 4x + 4x + 16 + 3$

$= x^2 + 8x + 19$

ex 6) $f(x) = 4x^2 + 2x + 6$. Find $f(x-1)$.

$f(x-1) = 4(x-1)^2 + 2(x-1) + 6 = 4(x-1)(x-1) + 2(x-1) + 6$

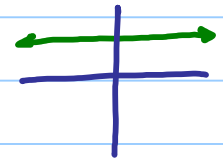
$= 4(x^2 - 2x + 1) + 2(x-1) + 6 = 4x^2 - 8x + 4 + 2x - 2 + 6$

$= 4x^2 - 6x + 8$

Vertical Line Test (function test)

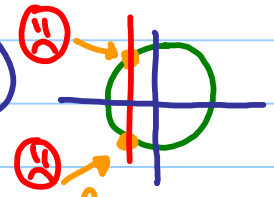
→ graph

ex 7a)



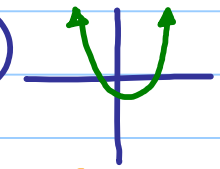
→ passes vert. line test ∴ is a function

b)



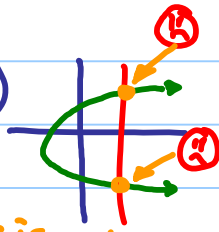
→ fails ∴ is not a function

c)

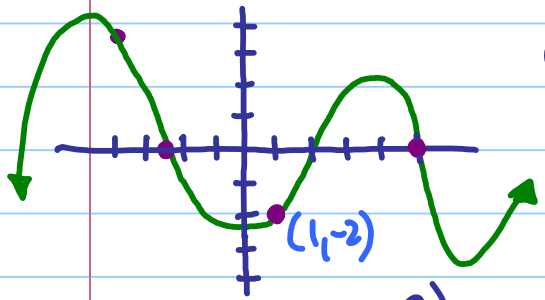


→ is a function

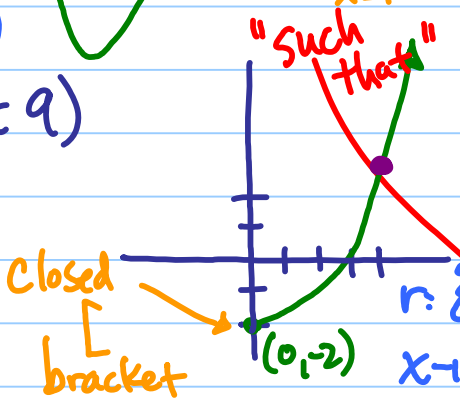
d)



→ is not a function



ex 9)



Closed bracket

Note: open circle (,)

inequalities

ex 8) Find $f(1), f(5), f(-2.5)$, & $f(-4)$.

→ $f(1) = -2$, $f(5) = 0$, $f(-2.5) = 0$,

$f(-4) = 3.5$

($x = 1$, y)

Find domain, range, x-int, y-int, & $f(4)$. (x-values, y-values; interval notation; $y = 0$, $x = 0$)

d: $x \geq 0$ or $[0, \infty)$ or $\{x \mid x \geq 0\}$ set builder notation

r: $\{y \mid y \geq -2\}$ or $[-2, \infty)$

x-int: $(3, 0)$, y-int: $(0, -2)$, $f(4) = 3$

HW: p159, 2-50 EOE, 56-64 all, 71-76 all, 78-92 EOE