HOMEWORK 6-6

) $f(x)=x-2 \quad g(x)=x^2-3x+2$

a) find $f+g$

$x-\cancel{2}+x^2-3x+\cancel{2}=\boxed{x^2-2x}$ DOMAIN: $\mathbb{R}$ (all real numbers)

b) find $f-g$

$x-2-(x^2-3x+2)$

$=x-2-x^2+3x-2=\boxed{-x^2+4x-4}$ Domain: $\mathbb{R}$ all Real numbers

c) find $f \cdot g$

$(x-2)(x^2-3x+2)$

"FOIL"

x^3-3x^2+2x

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

$=\boxed{x^3-5x^2+8x-4}$

or

"BOX METHOD"

	x^2	$-3x$	$+2$
x	x^3	$-3x^2$	$+2x$
-2	$-2x^2$	$+6x$	-4

$=\boxed{x^3-5x^2+8x-4}$

Domain: $\mathbb{R}$ (all real numbers)

d) find $\frac{f}{g}=\frac{x-2}{x^2-3x+2}=\frac{\cancel{x-2}}{\cancel{(x-2)}(x-1)}=\frac{1}{x-1}$

factor

rational function (cannot have $\emptyset$ in the denominator)

$\boxed{\text{Domain}}$: $\mathbb{R}/1$ (all real numbers except 1)

or $(-\infty,1)\cup(1,\infty)$

e) Find $f \circ g = f(g(x))$ $\quad f(x) = x-2 \quad g(x) = \underline{x^2-3x+2}$

$= f(x^2-3x+2) = x^2-3x\cancel{+2}\cancel{-2}$

$\boxed{x^2-3x}$

Domain: $\mathbb{R}$ (polynomial)

f) Find $g \circ f = g(f(x)) = g(x-2)$ $\quad f(x) = \boxed{x-2} \quad g(x) = x^2-3x+2$

$= (x-2)^2 - 3(x-2) + 2$

$= x^2 - 4x + 4 - 3x + 6 + 2$

$= \boxed{x^2 - 7x + 12}$

Domain: $\mathbb{R}$ (polynomial)

2) a) discount 15% (100% − 15% = 85%)

$f(x) = 0.85x$

b) rebate \$1000

$g(x) = x - 1000$

c) composite function / discount first

$g \circ f_{(x)} = g(\underline{f(x)}) = g(0.85x) = 0.85x - 1000$

$= 0.85 \cdot 18{,}000 - 1000$

$= \boxed{14{,}300}$

this first

d) composite function / rebate first

$f \circ g_{(x)} = f(g(x)) = f(x-1000) = 0.85(x-1000)$

this first

$\boxed{0.85x - 850}$

$= 0.85 \cdot 18{,}000 - 850 = \boxed{14{,}450}$

e) The dealer will want to apply the discount after the rebate (rebate first) because that would make the customer having to pay more for the car (14,450 > 14,300)

HOMEWORK 6-7

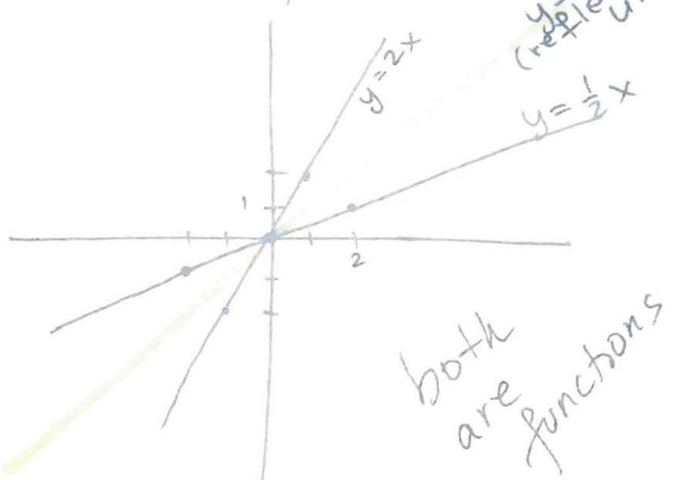
1) a) $y = \frac{x}{2} = \frac{1}{2}x$

inverse: $x = \frac{y}{2}$

solve for y: $2x = y$

$\boxed{y = 2x}$

yes, Linear function



both are functions

Domain: $\mathbb{R}$

Range: $\mathbb{R}$

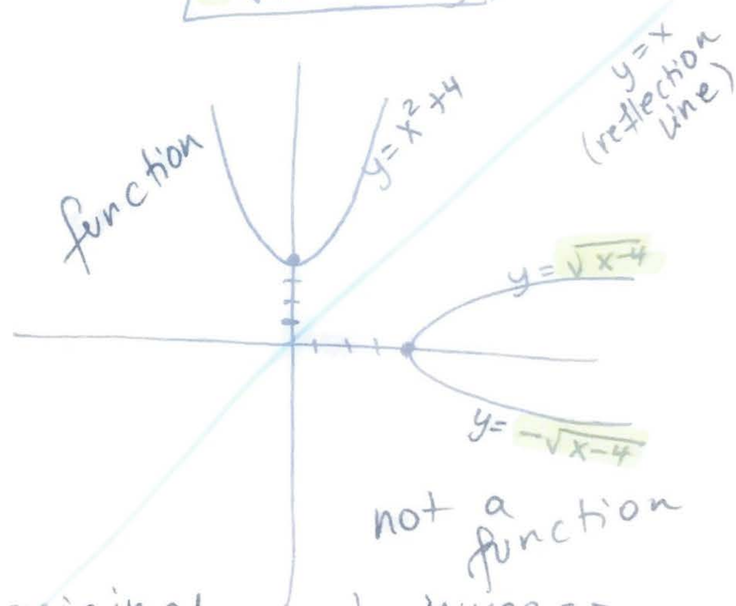
b) $y = x^2 + 4$

inverse: $x = y^2 + 4$

solve for y: $x - 4 = y^2$

$\boxed{\pm\sqrt{x-4} = y}$

function



not a function

original

Domain: $\mathbb{R}$

Range: $y \geq 4$

INVERSE:

Domain $x \geq 4$

Range: $\mathbb{R}$

1) c) $y = (3x-4)^2$

inverse: $x = (3y-4)^2$

solve for y: $\pm\sqrt{x} = 3y-4$

$\pm\sqrt{x} + 4 = 3y$

$\dfrac{\pm\sqrt{x}+4}{3} = y$

$$\boxed{y = \pm\frac{1}{3}\sqrt{x} + \frac{4}{3}}$$

not a function

2) $A = \pi r^2$ DOMAIN: $r > 0$ range: $A > 0$
(area and radius cannot be neg.)

a) inverse of a formula means to solve for the other variable

$\dfrac{A}{\pi} = r^2$ $\quad \pm\sqrt{\dfrac{A}{\pi}} = r$ inverse is not a function, however the Domain and range also switch so new Domain is

$A > 0$ $\quad r > 0$

therefore $r = \sqrt{\dfrac{A}{\pi}}$ is a function.

b)

$$r = \sqrt{\frac{A}{\pi}} = \sqrt{\frac{82}{\pi}} = \boxed{5.1 \text{ in}}$$