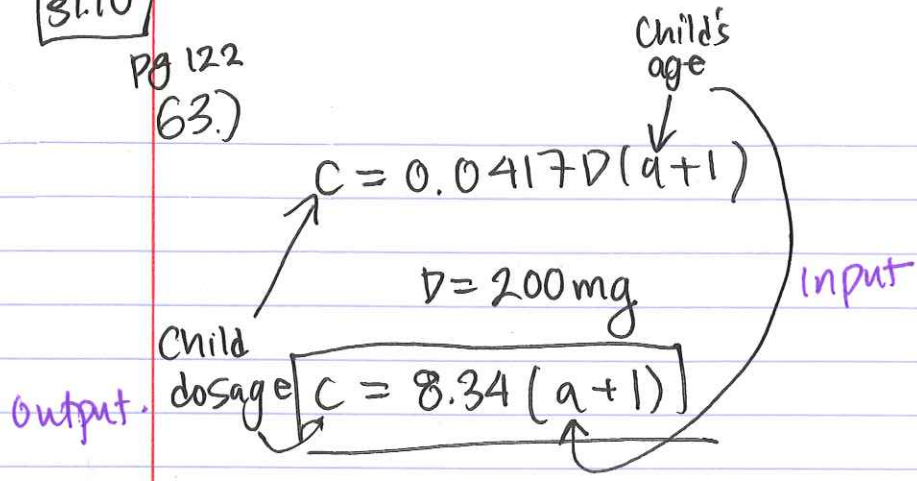
§1.10

Pg 122

63.)

1/28/2011

Section 12



(a) Find slope. What does it represent?

$$m = 8.34 = \frac{\Delta \text{ dosage (mg)}}{\Delta \text{ age (years)}}$$

(with respect to)

The rate of change of the dosage w.r.t. age is 8.34 mg/year.

For each year, the child dosage increases by 8.34 mg.

(b) What is dosage for a newborn?

$a \approx 0$

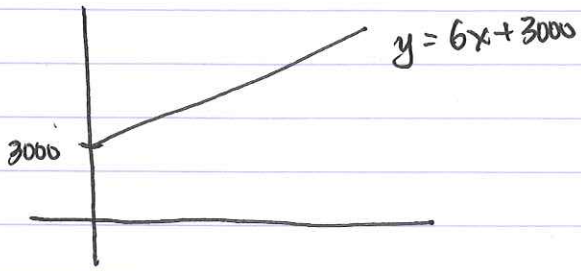
$C = 8.34(0+1) = \boxed{8.34 \text{ mg}}$

#65.) $y = 6x + 3000$

y: cost

x: # of toasters

(a)



(b) $m = 6 = \frac{\Delta \text{ output}}{\Delta \text{ input}} = \frac{\Delta \text{ cost } (\$)}{\Delta \text{ \# of toasters (toasters)}}$

$\$6$ / toaster.

It costs $\$6$ to produce each toaster.

y int? $\$3000$ is the fixed cost.

(the $\$$ I have to spend regardless of production levels.)

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§2.1 "What is a function?"

Def A function is a relationship between inputs and outputs that satisfies

"For each input, we get at most one output!"

Four Ways to Represent functions:

1.) Word descriptions: Determine if the following describes a function

(a) Given a human,
output the name of their biological mother.

Yes, for each human, there is only ONE biological mother.

(b) Given a human,
output the name of a sibling.

No, because some humans have many sibling. (more than one)

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2) Tabular / Table.

Is y a function of x?

output → y = f(x) ← input

(a)

x	0	1	0
y	1	1	1

yes, since for each x, there is at most one y.

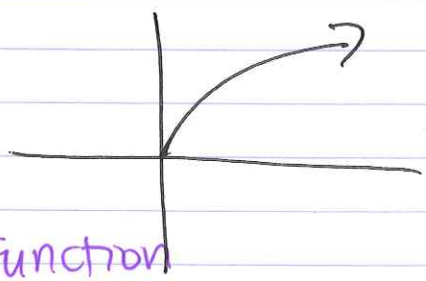
(b)

x	0	1	0
y	1	2	3

no, since for x = 0, y = 1, 3 are corresponding value.

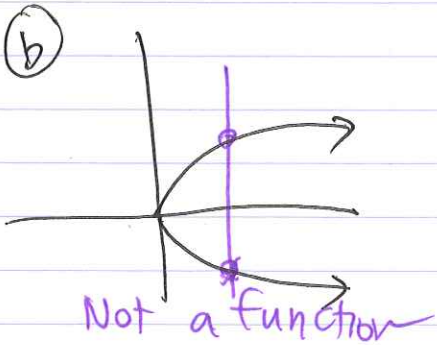
3.) Graphs

(a)



Function

(b)



Not a function

V.L.T. If every vertical line passes through graph at most once, then the graph represents a function.

4.) Equation: Is Q a function of t?

$Q = f(t)$?

(a)

$$\frac{Q+3}{Q-3} = t^2$$

$$Q+3 = (Q-3)t^2$$

$$Q+3 = Qt^2 - 3t^2$$

$$Q - Qt^2 = -3t^2 - 3$$

$$Q(1-t^2) = -3t^2 - 3$$

$$Q = \frac{-3t^2-3}{1-t^2}$$

$$\boxed{Q = \frac{3t^2+3}{t^2-1}}$$

Yes Q is a function of t.

(b) $Q^2 - 2 = t + 5$

$$\sqrt{Q^2} = \sqrt{t+7}$$

$$|Q| = \sqrt{t+7}$$

$$Q = \pm\sqrt{t+7}$$

$\Rightarrow$ No, Q is NOT a function of t.

$t = 0 \longleftrightarrow Q = \pm\sqrt{7}$.

Def The domain is the set of allowable inputs.

The range is the set of all the outputs

Comments: Range → use the graph to figure this out.

Domain can be computed by hand:

2 problems:

1.) $\frac{f(x)}{g(x)}$ ← can't divide by zero

Solve: $g(x) \neq 0$

2.) $\sqrt[n]{f(x)}$ n even

must be nonnegative.

Solve $f(x) \geq 0$.

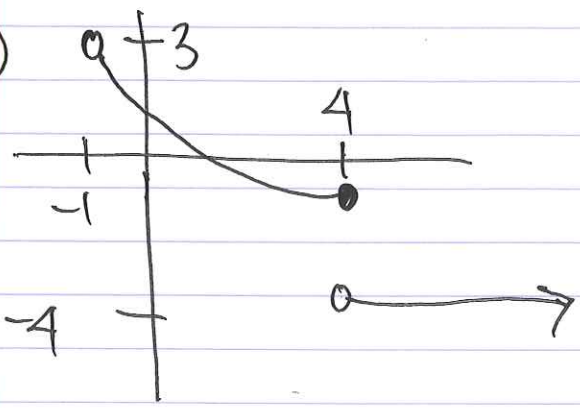
Example: Find the domain of each function:

(a)

x	0	1	2	π
y	1/2	1/4	1/8	1/16

D: $\{0, 1, 2, \pi\}$

(b)



unsimplified.

D: $(-1, 4] \cup (4, \infty)$

$(-1, \infty)$

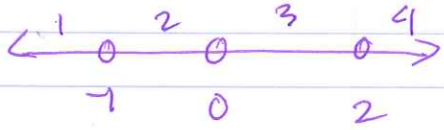
(c) $f(x) = \dfrac{x+1}{x^3 - x^2 - 2x}$

$x^3 - x^2 - 2x \neq 0$

$x(x^2 - x - 2) \neq 0$

$x(x-2)(x+1) \neq 0$

$x \neq 0, \; x \neq 2, \; x \neq -1$



$(-\infty, -1) \cup (-1, 0) \cup (0, 2) \cup (2, \infty)$

(d) $s(Q) = \sqrt{\dfrac{Q}{(Q+1)(Q-1)(Q^2-3)}}$

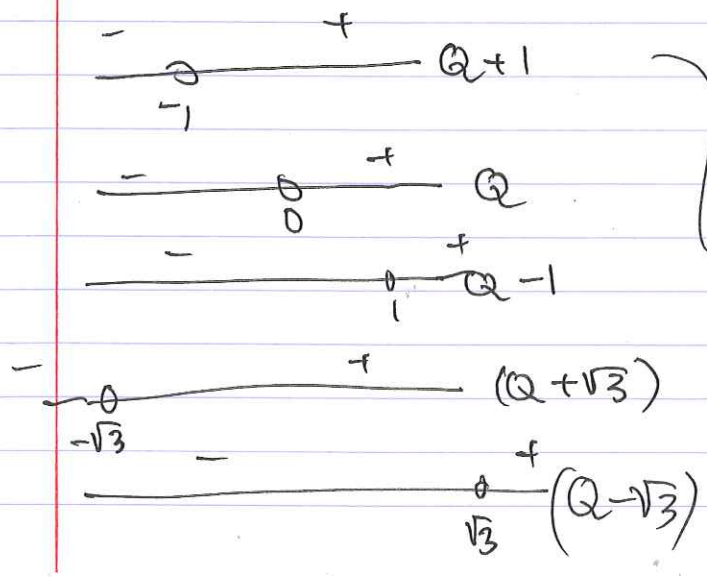
can't be neg

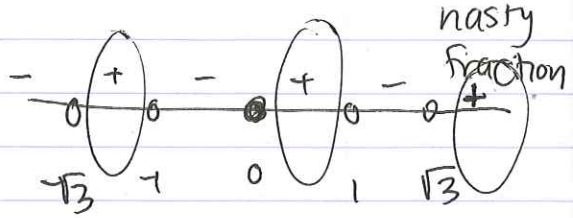
can't be zero.

denom: $(Q+1)(Q-1)(Q^2-3) \neq 0$

$Q \neq -1, \; 1, \; \pm\sqrt{3}$

even radical: $\dfrac{Q}{(Q+1)(Q-1)(Q^2-3)} \geq 0.$





$(-\sqrt{3}, -1) \cup [0, 1) \cup (\sqrt{3}, \infty)$