

# 1.3 Linear Equations in Two Variables

## Vocab

slope  $\Rightarrow$

linear equation in two variables  $\Rightarrow$

parallel lines  $\Rightarrow$

perpendicular lines  $\Rightarrow$

linear extrapolation  $\Rightarrow$

linear interpolation  $\Rightarrow$

synonyms for slope

rate  
ratio  
speed

## Formulas

slope

## lines

Point-slope form

slope-intercept form

vertical line!

horizontal line!

perpendicular slopes

parallel slopes

1.3 (cont)

slopes

↙ positive ↘

↖ negative ↗

← zero →

↑ undefined ↓

Ex 1 Find slope and y-intercept of these lines.

(a)  $y = -\frac{3}{2}x + 4$

(b)  $2x + 3y = 9$

(c)  $x - 5 = 0$

(d)  $y = 3$

Ex 2 Find the slope of the line between  $(\frac{7}{8}, \frac{3}{4})$  and  $(\frac{5}{4}, \frac{1}{4})$ .

1.3 (cont)

EX 3 Find eqn of line w/ the given information.

(a) through  $(-1, -6)$  w/  $m = -\frac{1}{2}$

(b) thru  $(-10, 4)$  w/ undefined slope

(c) through pts  $(1, 1)$  and  $(6, -\frac{2}{3})$ .

### 1.3 (cont)

Ex 4 Write the equ of a line through  $(-5, 1)$  and  
 $\perp$  (perpendicular) to the line  $2x - 3y = 6$ .

Ex 5 Find an equation that relates  $x$  and  $y$  such that  
the point  $(x, y)$  is equidistant from the two pts  
 $(-\frac{1}{2}, -4)$  and  $(\frac{7}{2}, \frac{5}{2})$ .

## 1.4 Functions

### Vocab

function  $\Rightarrow$  (notation  $f(x)$ )

domain  $\Rightarrow$   
(implied domain)

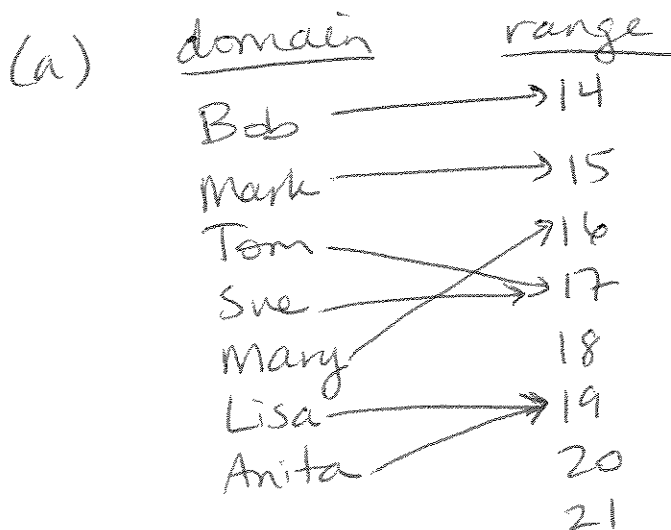
range  $\Rightarrow$

(~~\*~~ see characteristics pg 40 of book)

independent variable

dependent variable

EX 1 Are these relationships functions?



1.4 (cont)

Ex 1 (cont)

(b) Given  $A = \{1, 2, 3, 4, 5\}$   $B = \{0, 10, 20, 30, 40, 50, 60\}$   
ordered pairs  $\{(1, 30), (5, 10), (4, 50), (3, 10)\}$

(c)  $2y = \sqrt{x-1}$

(d)  $x-3 = y^2$

(e)  $x^2 + y^2 = 10$

Ex 2 Evaluate for  $f(x) = \sqrt{x+8} + 2$

(a)  $f(-8)$

1.4 (cont)

Ex 2 (cont)

(b)  $f(x-8)$

(c)  $f(1)$

Ex 3 Given  $f(x) = \begin{cases} 9-x^2, & x < 3 \\ x-3, & x \geq 3 \end{cases}$

fill in table.

x	f(x)
1	
2	
3	
4	
5	

1.4 (cont)

Ex 4 Find domain for these functions.

(a)  $f(t) = \sqrt[3]{t+4}$

(b)  $h(x) = \frac{10}{x^2 - 2x}$

(c)  $f(x) = \frac{\sqrt{x+b}}{b+x}$

Ex 5 For  $f(x) = 4x^2 - 2x$ , find  $\frac{f(x+h) - f(x)}{h}$  ( $h \neq 0$ )



# 1.5 Analyzing Graphs of Functions

## Vocab

- Zeros of a function (a.k.a. roots)  $\Rightarrow$  all  $x$ -values  $\ni f(x) = 0$ .



OBJECTIVES FOR FUNCTIONS

- increasing  $\Rightarrow$  a fn is increasing if  $\forall x_1$  and  $x_2 \ni x_1 < x_2 \Rightarrow f(x_1) < f(x_2)$
- decreasing
- constant

- relative minimum  $\Rightarrow f(a)$  is rel. min. for  $f(x)$  if  $\exists (x_1, x_2) \ni a \in (x_1, x_2)$  and  $x_1 < x < x_2 \Rightarrow f(a) \leq f(x)$

- relative maximum  $\Rightarrow$

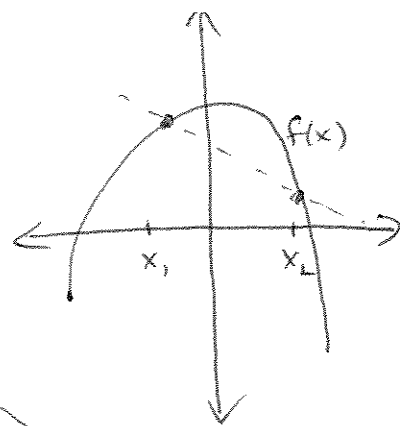
- even function  
 $f(-x) = f(x) \quad \forall x$

- odd function  
 $f(-x) = -f(x) \quad \forall x$

## Processes

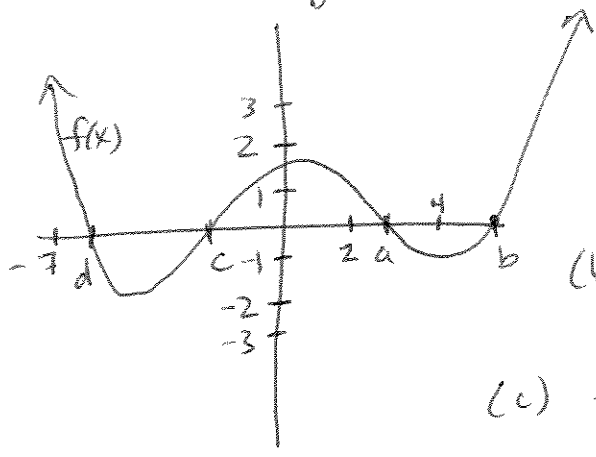
- ① Vertical Line Test  $\Rightarrow$

avg rate of change  $\Rightarrow$



1.5 (cont)

EX 1 Use this graph to answer the questions.



(a) what is domain and range?

(b) find  $f(-7)$

(c)  $f(2)$

(d) what are the zeros (roots) of  $f(x)$ ?

(e) Is this a function?

(f) determine intervals where  $f(x)$  is  
• increasing  
• decreasing  
• constant

EX 2 Find the zeros of  $f(x) = \frac{x^2 - 9x + 14}{4x}$ .

1.5 (cont)

Ex 3 Determine if  $f(x)$  is even or odd or neither.

(a)  $f(x) = x^3 - 7x$

(b)  $f(x) = x^4 + 2x^2 - \sqrt{1-x^2}$

(c)  $f(x) = 2x^5 - 9$

Ex 4 Graph  $f(x) = x^2 - 4x$ .

1.5 (cont)

Ex 5 Find the average rate of change of  $f(x)$  from  $x_1$  to  $x_2$ .

(a)  $f(x) = x^2 - 2x + 8$        $x_1 = 1, x_2 = 5$

(b)  $f(x) = -\sqrt{x+1} + 3$        $x_1 = 3, x_2 = 8$