

BE - Alg. 2 & Precalc TUESDAY 9-21-10

REAL
ACT
2ND
PT 2

- ① The depth of A pond is 180 cm
And is being reduced by 1 cm per week.
The depth of A second pond is
160 cm And is being reduced by
 $\frac{1}{2}$ cm per week. If the depths of
both ponds continue to be reduced at
these constant rates, in about how
many weeks will the ponds have the
same depth?

ANS

Let w = weeks d = depth

$$m = \text{Slope} \Rightarrow \frac{\text{cm}}{\text{week}}$$

$$b = \text{STARTING depth} = \text{cm}$$

Skeleton MAKE
UNITS
WORK
"per" = slope

$$\therefore \frac{?}{?} = \frac{\text{cm}}{\text{WK}} \frac{?}{?} + \text{cm}$$

$$\text{cm} = \frac{\text{cm}}{\text{WK}} \cdot \text{WK} + \text{cm}$$

$$\begin{cases} d = -1w + 180 \\ \textcircled{d} = -\frac{1}{2}w + 160 \end{cases}$$

$$-w + 180 = -\frac{1}{2}w + 160$$

$$+w \quad -160 \quad +w \quad -160$$

$$20 = \frac{1}{2}w$$

$$\therefore \boxed{w = 40 \text{ weeks}}$$

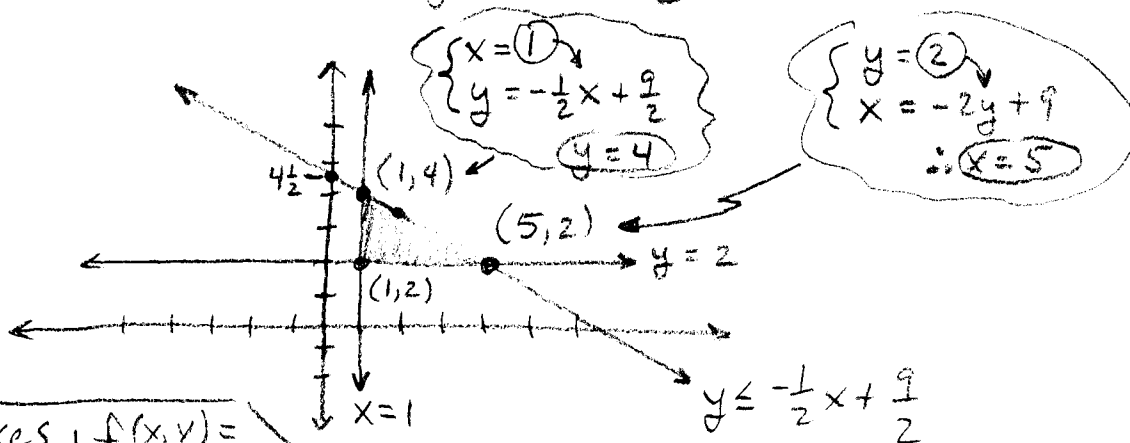
Homework review: Pg. 132 # 3, 5

③

$$\begin{cases} y \geq 2 \\ x \geq 1 \\ x + 2y \leq 9 \end{cases} \Rightarrow$$

$$f(x, y) = 2x - 3y$$

$$2y \leq -x + 9 \\ y \leq -\frac{1}{2}x + \frac{9}{2}$$



Vertices (x, y)	$f(x, y) = 2x - 3y$
(1, 2)	$2(1) - 3(2) = -4$
(1, 4)	$2(1) - 3(4) = -10 = \text{min}$
(5, 2)	$2(5) - 3(2) = 4 = \text{MAX}$

⑤

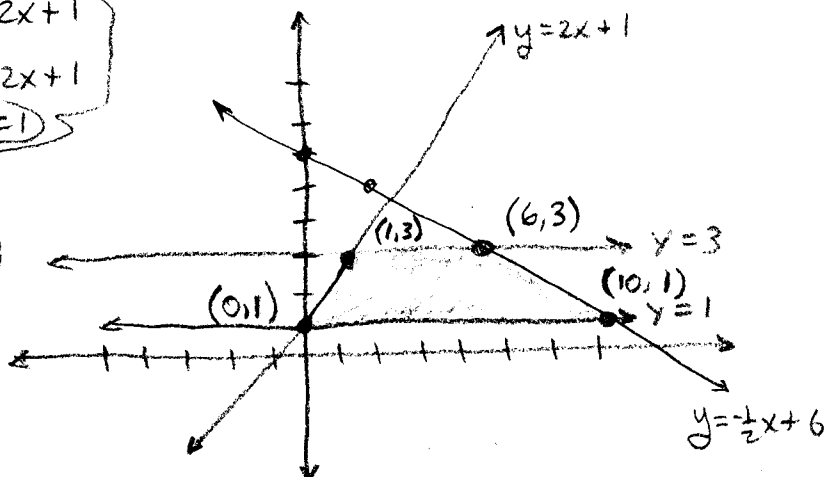
$$\begin{cases} y \leq 2x + 1 \\ 1 \leq y \leq 3 \\ x + 2y \leq 12 \end{cases} \Rightarrow$$

$$\begin{cases} y \leq 2x + 1 \\ y \geq 1 \\ y \leq 3 \\ y \leq -\frac{1}{2}x + 6 \end{cases}$$

$$f(x, y) = 3x + y$$

$$\begin{cases} y = 3 \\ y = 2x + 1 \\ 3 = 2x + 1 \\ x = 1 \end{cases}$$

$$\begin{cases} y = 1 \\ y = 2x + 1 \\ 1 = 2x + 1 \\ x = 0 \end{cases}$$



$$\begin{cases} y = 3 \\ y = -\frac{1}{2}x + 6 \\ 3 = -\frac{1}{2}x + 6 \\ -\frac{3}{1} - 3 = -\frac{1}{2}x \cdot -\frac{2}{1} \\ 6 = x \end{cases}$$

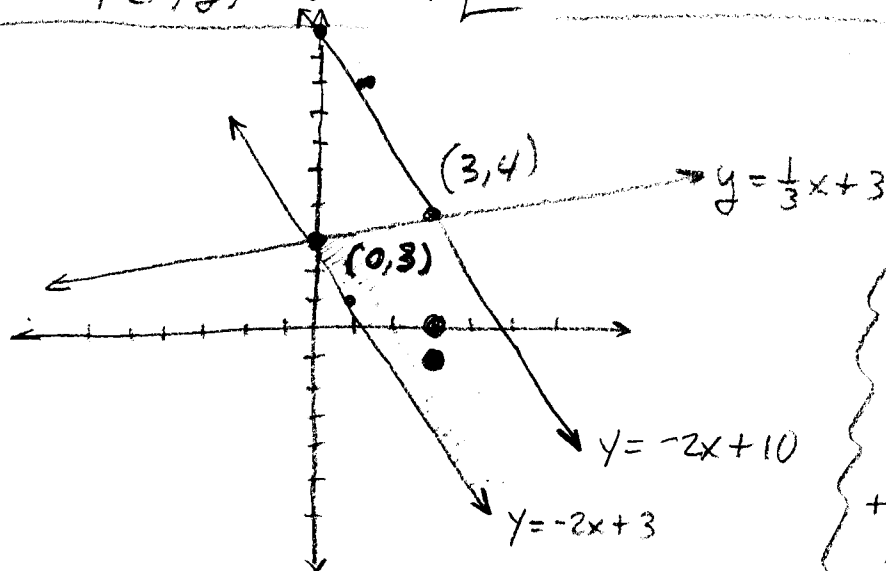
$$\begin{cases} y = 1 \\ y = -\frac{1}{2}x + 6 \\ 1 = -\frac{1}{2}x + 6 \\ -\frac{2}{1} - 5 = -\frac{1}{2}x \cdot -\frac{2}{1} \\ 10 = x \end{cases}$$

(x, y)	$f(x, y) = 3x + y$
(0, 1)	$3(0) + (1) = 1 = \text{min}$
(1, 3)	$3(1) + (3) = 6$
(6, 3)	$3(6) + (3) = 21$
(10, 1)	$3(10) + (1) = 31 = \text{max}$

Ex2 Pg 130 An unbounded region

$$\begin{cases} 2x + y \geq 3 \Rightarrow y \geq -2x + 3 \\ 3y - x \leq 9 \Rightarrow 3y \leq x + 9 \Rightarrow y \leq \frac{1}{3}x + 3 \\ 2x + y \leq 10 \Rightarrow y \leq -2x + 10 \end{cases}$$

$$f(x, y) = 5x + 4y$$



$$\begin{cases} y = \frac{1}{3}x + 3 \\ y = -2x + 10 \end{cases}$$

$$\frac{1}{3}x + 3 = -2x + 10$$

$$+2x - 3 \quad +2x - 3$$

$$2\frac{1}{3}x = 7$$

$$\frac{3}{7} \cdot \frac{7}{3}x = 7 \cdot \frac{3}{7}$$

$$x = 3$$

$$y = 4$$

Vertices (x, y)	f(x, y) = 5x + 4y
(0, 3)	5(0) + 4(3) = 12
(3, 4)	5(3) + 4(4) = 31 = MAX

Is 12 the minimum, try a few points in the unbounded region

$$(3, 0) \quad 5(3) + 4(0) = 15$$

$$(3, -1) \quad 5(3) + 4(-1) = 11 < 12 \Rightarrow \text{No minimum}$$

Ch. 4-1 INTRO. TO MATRICES

MATRIX A RECTANGULAR ARRAY OF VARIABLES OR CONSTANTS IN ROWS AND COLUMNS ↓.

- NAMED BY NUMBER OF ROWS X NUMBER OF COLUMNS
- ENCLOSED IN BRACKETS

EX $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

2x2 MATRIX

$B = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \end{bmatrix}$

2x4 MATRIX

$C = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$

3x1 MATRIX

$D = \begin{bmatrix} x & y \end{bmatrix}$

1x2 MATRIX

The $R \times C \Rightarrow$ dimensions of the matrix

SPECIAL MATRICES:

ROWS = COLUMNS
"SQUARE" MATRIX

EX

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

3x3

ROW MATRIX
1 ROW

EX

$$\begin{bmatrix} 1 & 2 & 3 & 4 \end{bmatrix}$$

1x4

COLUMN MATRIX
1 COLUMN

EX

$$\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

3x1

ZERO MATRIX
"ALL ZEROS"

EX

$$\begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

3x4

Each value in a matrix is an element.

Each position is named by its row and column (SUBSCRIPTS)

EX $\begin{bmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{bmatrix}$

Two matrices are considered equal ~~if~~:

1. They have the same dimensions
2. Each element of one matrix = each corresponding element in the other matrix.

EX

$$A = \begin{bmatrix} 2 & 4 \\ 6 & 9 \end{bmatrix} \quad B = \begin{bmatrix} 2 & 4 \\ 6 & 9 \end{bmatrix} \quad A = B$$

EX

$$A = \begin{bmatrix} x \\ y \end{bmatrix} \quad B = \begin{bmatrix} y-4 \\ x+6 \end{bmatrix}$$

If $A = B$ then $x = y - 4$
and $y = x + 6$

EX 3
Pg 155

Solve $\begin{bmatrix} y \\ 3x \end{bmatrix} = \begin{bmatrix} 6-2x \\ 31+4y \end{bmatrix}$ for x and y

$$y = 6 - 2x$$

$$3x = 31 + 4y$$

$$3x = 31 + 4(6 - 2x)$$

$$3x = 31 + 24 - 8x$$

$$11x = 55$$

$$x = 5$$

$$\therefore y = -4$$

$$(5, -4)$$

Homework: Pg 132 #8, 19 - Pg 156 #1, 6, 7, 10-15.