BE-Alg.2 TUESDAY 9-27-11

Real ACT 2nd Ed PT2 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 = slope $\Rightarrow \frac{cm}{week}$ b = starting depth = cm

Skeleton: MAKE UNITS week "per" = slope

$$\therefore \frac{?}{} = \frac{cm}{wk}\frac{?}{} + cm$$

$$cm = \frac{cm}{wk} \cdot wk + cm$$

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

$$-w + 180 = -\frac{1}{2}w + 160$$
$$+w \quad -160 \quad +w \quad -160$$
$$20 = \frac{1}{2}w \quad \therefore \boxed{w = 40 \text{ weeks}}$$

Homework review: Pg. 132 # 3, 5

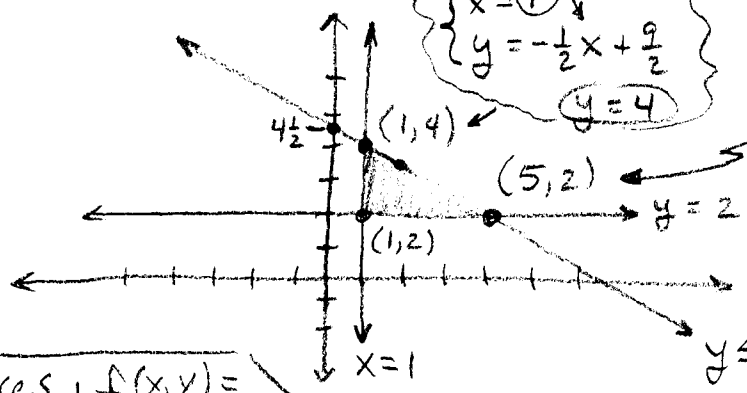
$f(x,y) = 2x - 3y$

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

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

$\begin{cases} x = 1 \\ y = -\frac{1}{2}x + \frac{9}{2} \end{cases}$ $y = 4$

$\begin{cases} y = 2 \\ x = -2y + 9 \end{cases}$ $\therefore x = 5$



Vertices (x,y)	f(x,y) = 2x - 3y
(1,2)	2(1) - 3(2) = -4
(1,4)	2(1) - 3(4) = -10 = MIN
(5,2)	2(5) - 3(2) = 4 = MAX

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⑤ $\begin{cases} y \leq 2x + 1 \\ 1 \leq y \leq 3 \\ x + 2y \leq 12 \end{cases} \Rightarrow \begin{cases} y \leq 2x + 1 \\ y \geq 1 \\ y \leq 3 \\ y \leq -\frac{1}{2}x + 6 \end{cases}$

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

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

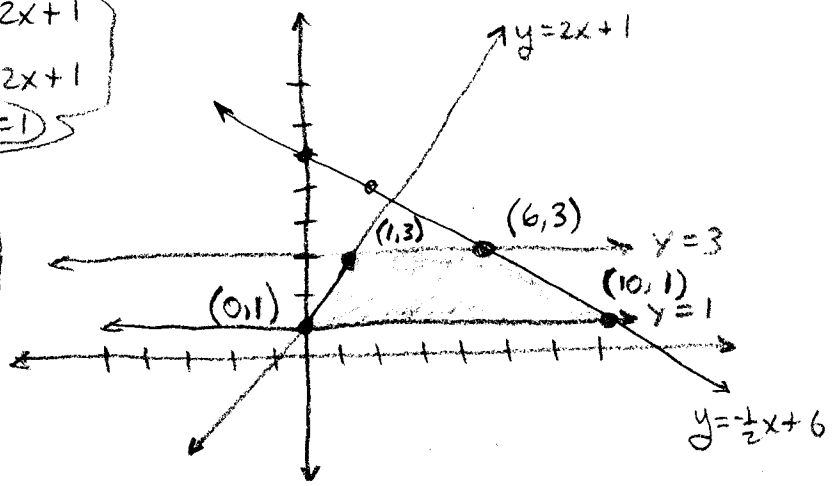
$\begin{cases} y = 3 \\ y = -\frac{1}{2}x + 6 \end{cases}$ $3 = -\frac{1}{2}x + 6$

$-\frac{2}{1} \cdot -3 = -\frac{1}{2}x \cdot -\frac{2}{1}$ $6 = x$

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

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

$-\frac{2}{1} \cdot -5 = -\frac{1}{2}x \cdot -\frac{2}{1}$ $10 = x$

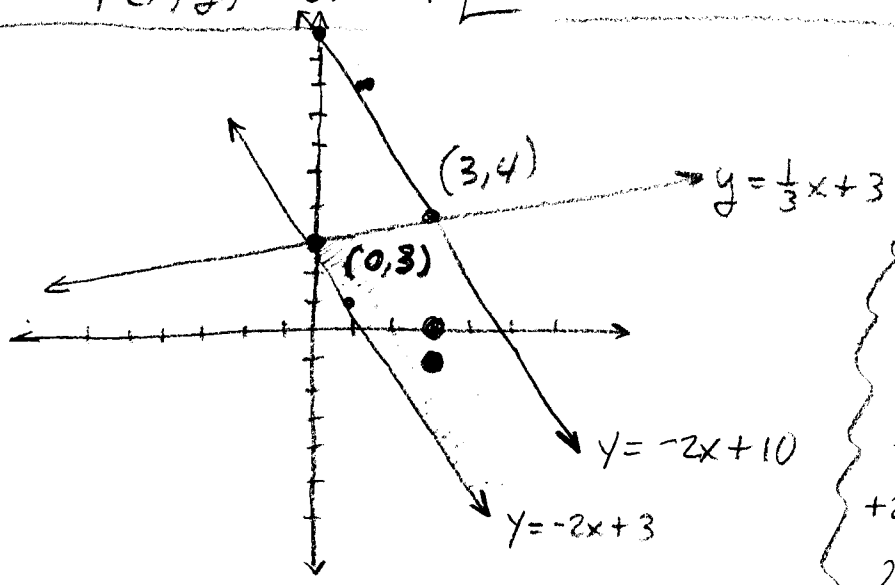


(x,y)	f(x,y) = 3x + y
(0,1)	3(0) + (1) = 1 = MIN
(1,3)	3(1) + (3) = 6
(6,3)	3(6) + (3) = 21
(10,1)	3(10) + (1) = 31 = MAX

Ex 2 Pg 130 An unbounded region

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

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



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

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

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

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

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

$x = 3$

$y = 4$

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

$(3,0)$	$5(3)+4(0) = 15$
$(3,-1)$	$5(3)+4(-1) = 11 < 12 \Rightarrow$ 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 × Number of Columns
- Enclosed in brackets

(Ex) $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ 2×2 matrix

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

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

$D = \begin{bmatrix} x & y \end{bmatrix}$ 1×2 matrix

The R×C ⇒ dimensions of the matrix

Special matrices:

Rows = Columns "square" matrix (Ex)

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

Row matrix 1 row (Ex)

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

Column matrix 1 column (Ex)

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

Zero matrix "all zeros" (Ex)

$\begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$ 3×4

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

$$y = 6 - 2x$$
$$3x = 31 + 4y$$
$$3x = 31 + 4(6 - 2x)$$
$$3x = 31 + 24 - 8x$$
$$11x = 55$$
$$x = 5 \quad \therefore \quad y = -4 \qquad (5, -4)$$

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