



## MATH 140: WEEK-IN-REVIEW 1 (1.1, 1.2 & 2.1)

### Problem 1

$$A = \begin{bmatrix} 1 & 0 \\ -1 & -2 \end{bmatrix} \quad B = \begin{bmatrix} 1 & -1 & 3 \\ 0 & 2 & 1 \end{bmatrix} \quad C = \begin{bmatrix} 1 & -2 \\ 0 & 2 \\ 4 & -1 \end{bmatrix} \quad D = \begin{bmatrix} 1 & -2 & 0 \\ -1 & 3 & 2 \end{bmatrix} \quad E = \begin{bmatrix} 1 & -1 & 3 \\ 0 & 1 & 0 \\ 1 & -2 & 3 \end{bmatrix}$$

(a) Using the matrices above, determine whether or not the following operations are possible. If an operation is possible, give the size (dimensions) of the resulting matrix and then perform the operation. If the operation is not possible, explain why not.

(i)  $8A$

(ii)  $B + E$

(iii)  $D - 3B$

(iv)  $C^T$



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(v)  $AD$

(vi)  $DA$



$$A = \begin{bmatrix} 1 & 0 \\ -1 & -2 \end{bmatrix} \quad B = \begin{bmatrix} 1 & -1 & 3 \\ 0 & 2 & 1 \end{bmatrix} \quad C = \begin{bmatrix} 1 & -2 \\ 0 & 2 \\ 4 & -1 \end{bmatrix} \quad D = \begin{bmatrix} 1 & -2 & 0 \\ -1 & 3 & 2 \end{bmatrix} \quad E = \begin{bmatrix} 1 & -1 & 3 \\ 0 & 1 & 0 \\ 1 & -2 & 3 \end{bmatrix}$$

(vii)  $5CAB =$

(b) Using the given matrices, determine  $a_{12} - 3c_{32} + e_{22}$ .



**Problem 2** Solve the following matrix equation for  $X$ . Assume the dimensions of all matrices are such that all required matrix algebra is defined.

$$3X + C = 10X - A$$

**Problem 3** Solve the following matrix equations for the variables  $x$ ,  $y$ ,  $z$ , and  $u$ . If this is not possible, then explain why not.

(a)

$$\begin{bmatrix} (x+4) & 5 \\ -8 & y \end{bmatrix} + \begin{bmatrix} u & z \\ -7 & 2 \end{bmatrix}^T = \frac{1}{2} \begin{bmatrix} 8 & (u+6) \\ -4 & (3y+7) \end{bmatrix}$$



(b)

$$\begin{bmatrix} 1 & -1 \\ 0 & -2 \end{bmatrix} \begin{bmatrix} -2x & 0 \\ 3 & 4 \end{bmatrix} - 3 \begin{bmatrix} (y-1) & x \\ 4 & (2z+1) \end{bmatrix} = \begin{bmatrix} -7 & -2u \\ -10 & 8 \end{bmatrix}^T$$



**Problem 4** *Two rival stores have sales in August before school starts. In August, Store X sells 50 Trapper Keepers (cool 80's binders), 150 boxes of blue pens, and 75 mechanical pencil sets, but Store Y sells 100 mechanical pencil sets, 200 boxes of blue pens, and 80 Trapper Keepers.*

(a) *Organize this information into a  $3 \times 2$  matrix,  $Q$ . Label all rows and columns.*

(b) *If in August both stores sell Trapper Keepers for \$10, mechanical pencil sets for \$8, and boxes of blue pens for \$5, write a matrix  $P$  that could be used to multiply matrix  $Q$  by, in order to have the August revenue at the two stores from the three products. Again, label all rows and columns.*



**Problem 5** *Bolli Bros. and Pizza Nut are two restaurants which each sell pizza rolls (in batches of 6 rolls), calzones and orders of cheese sticks at the prices given in matrix A. The prep and cook times for each food item is given in matrix B, as well as the number of items two school districts will order, in matrix C. Determine which of the products below, if any, make sense.*

$$A = \begin{matrix} & \begin{matrix} \text{BolliBros.} & \text{PizzaNut} \end{matrix} \\ \begin{matrix} \text{PizzaRolls} \\ \text{Calzone} \\ \text{CheeseSticks} \end{matrix} & \begin{bmatrix} \$5.95 & \$8.00 \\ \$6.95 & \$9.99 \\ \$3.95 & \$6.99 \end{bmatrix} \end{matrix} \quad C = \begin{matrix} & \begin{matrix} \text{XISD} & \text{ZISD} \end{matrix} \\ \begin{matrix} \text{PizzaRolls} \\ \text{Calzone} \\ \text{CheeseSticks} \end{matrix} & \begin{bmatrix} 100 & 85 \\ 75 & 100 \\ 50 & 60 \end{bmatrix} \end{matrix}$$

$$B = \begin{matrix} & \begin{matrix} \text{PizzaRolls} & \text{Calzone} & \text{CheeseSticks} \end{matrix} \\ \begin{matrix} \text{PrepTime(Min)} \\ \text{CookTime(Min)} \end{matrix} & \begin{bmatrix} 5 & 3 & 2 \\ 6 & 7 & 6 \end{bmatrix} \end{matrix}$$

(a)  $AB$

(b)  $BA$

(c)  $BC$



**Problem 6** Find the slope of the line passing through the points  $(-4, 5)$  and  $(1, 9)$ .

**Problem 7** Find the equation of the line that passes through the point  $(-1, 2)$  and  
(a) has slope  $= 5/2$ .

(b) has slope  $= 0$ .

(c) has undefined slope.

(d) also passes through the point  $(3, -4)$ .





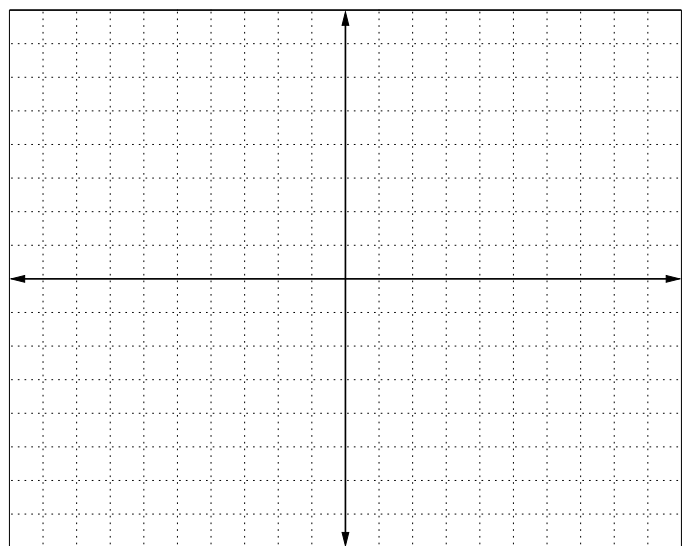
**Problem 8** Find the equation of the line passing through the point  $(8, -5)$  which is

(a) vertical.

(b) horizontal.

**Problem 9** Find the equation of the line which crosses the  $x$ -axis when  $x = 2$  and the  $y$ -axis when  $y = -3$ .

**Problem 10** Use the intercepts to accurately graph the line  $8x - \frac{1}{4}y = -2$ .





**Problem 11** Given  $3x - 7y = 14$ ,

(a) What is the slope of the line?

(b) What is the  $y$ -intercept of the line?

(c) What is the  $x$ -intercept of the line?

(d) As  $x$  increases, does  $y$  increase or decrease?

(e) If  $x$  decreases by 5 units, what is the corresponding change in  $y$ ?

(f) If  $y$  increases by 8 units, what is the corresponding change in  $x$ ?



**Problem 12** *The Acme Widget Co. produces regular and deluxe widgets out of wood. Each regular widget requires 2 units of wood; each deluxe widget requires 4 units of wood. There are 600 units of wood available for production each week.*

(a) *Assuming that all available units of wood are used up each week, write down a linear equation in standard form ( $Ax + By = C$ ) relating the number of regulars produced ( $x$ ) and the number of deluxes produced ( $y$ ).*

(b) *Write the equation in slope-intercept form.*

(c) *If the co. wants to make 10 less regulars, what does that do to the production of deluxes?*

(d) *If the co. wants to make 10 less deluxes, what does that do to the production of regulars?*

(e) *What are the maximum number of regulars that may be produced? Deluxes?  
How do these maximums appear in the graph of the equation?*