

# 1 MATH 140 HOGU: Exam 1 Review

**Problem 1.** The top five baseball players at Texas A&M have official game batting averages ( $G$ ) of .365, .325, .279, .263, and .248, respectively. However, during their practices these same five players have batting averages ( $P$ ) of .355, .348, .267, .265, and .232, respectively.

- (a) Organize this information in a  $5 \times 2$  matrix (call it  $B$ ). Label each row and column of your matrix that signifies what each row and column number means.

- (b) The baseball coach gives the players a goal to raise their batting averages by 3% next year, both in official play and in practice. Find a  $5 \times 2$  matrix representing the batting averages that each of these top 5 players would need to have in order to meet the coach's goal. *Round up* your answers to the nearest thousandth.

**Problem 2.** Let  $B = \begin{bmatrix} -15v & -3 & -12 \\ 9w & -5r & 1 \end{bmatrix}$  and let  $A = \begin{bmatrix} -1 & 18 \\ -8q & 4 \\ 12m & 2n \end{bmatrix}$ .

(a) Let  $E = 3A^T - 2B$ . Find  $e_{12}$ .

(b) Calculate  $BA$ .

**Problem 3.** Consider the line  $7x - 3y = 11$ . Circle the correct choice when prompted in the sentence below, then complete the sentence.

(a) If  $y$  decreases by 7 units,  $x$  (increases/decreases) by \_\_\_\_\_.

(b) If  $x$  increases by 11 units,  $y$  (increases/decreases) by \_\_\_\_\_.

(c) If  $y$  increases by 3 units,  $x$  (increases/decreases) by \_\_\_\_\_.

(d) If  $x$  decreases by 9 units,  $y$  (increases/decreases) by \_\_\_\_\_.

**Problem 4.** The demand equation for a sports watch is given by

$$p = -0.025x + 50.$$

(a) Given this model, above what price will consumers not buy the watch?

(b) Given this model, how many people would demand this item if it were free?





**Problem 7.** Last October Taylor Swift was trying to decide how much to sell the vinyl album of *1989 (Taylor's Version)* for, so she had her producer Jack Antonoff collect some data for her here at Texas A&M. He reported back: a \$20 vinyl album would create a demand for 24,000 copies among A&M students, but suppliers would only stock 8,000 copies at that price. However, for a \$60 vinyl album suppliers would carry 24,000 copies at their stores, but at exactly that price and above A&M students would not buy the vinyl at all.

(a) Compute the supply function  $p(x)$ , where  $x$  is the number of vinyl albums sold.

(b) Determine the demand function  $p(x)$ , where  $x$  is as above.

(c) At what price would both students and vinyl album suppliers be happy?

**Problem 8.** Solve the system of equations given below using the stated methods:

$$2x - y = 1$$

$$3x + 2y = 12$$

(a) Use the Substitution Method to solve.

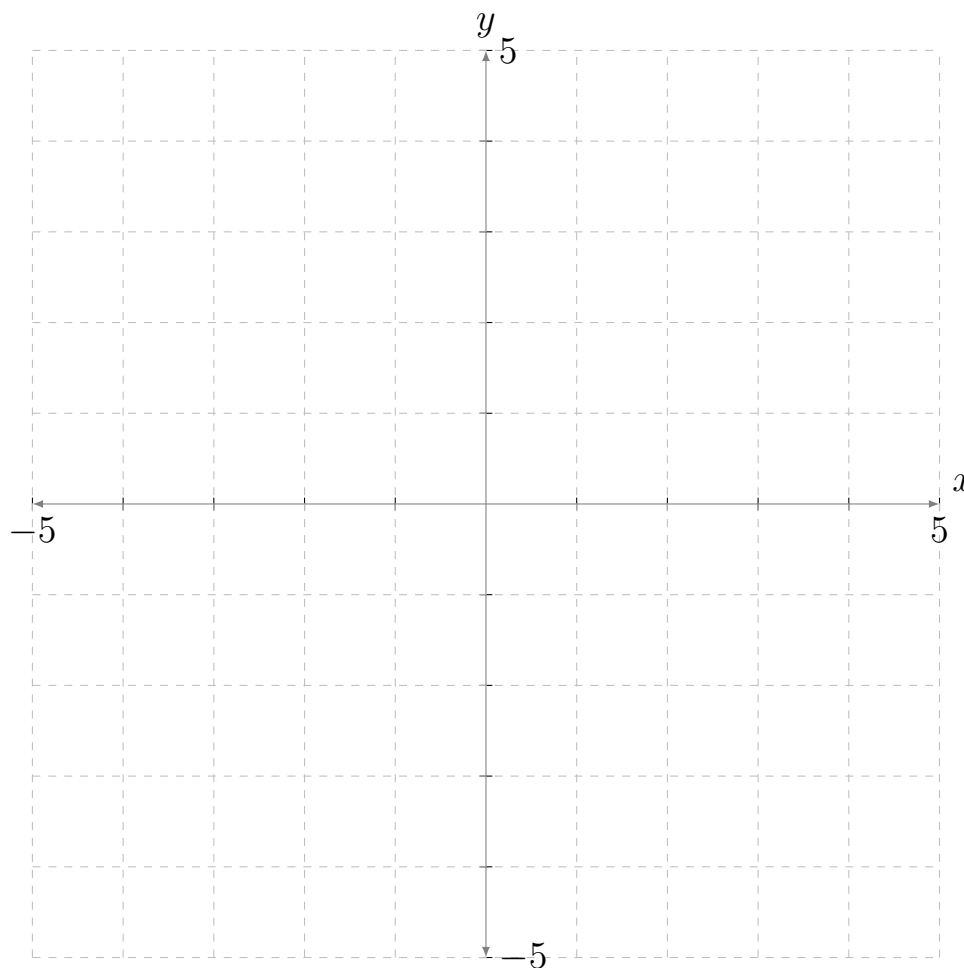
(b) Use the Addition Method to solve.



**Problem 9.** Fill in the table below.

Line	$x$ - intercept ( $y = 0$ )	$y$ -intercept ( $x = 0$ )
$\frac{5}{4}x - \frac{2}{3}y = 3$	( , )	( , )
$\frac{1}{4}x + \frac{5}{3}y = 6$	( , )	( , )

Graph each line on the plot below.



What is the intersection of these two lines?

**Problem 10.** The Aggie football bobblehead manufacturer manufactures a bobblehead at a cost of \$4 a unit and sells them for \$10 a unit. If making 1,000 bobbleheads costs the manufacturer \$16,000 in total, compute their break-even point. *Interpret* what your answer means in the context of this problem.

**Problem 11.** Texas A&M is starting a chain of Aggie-Strong Protein Shakes! There are small and large versions of these protein shakes. A batch of small shakes takes 20 minutes to prepare and 15 minutes to blend. A batch of large shakes takes 30 minutes to prepare and 30 minutes to blend. Texas A&M has 3,900 minutes dedicated to preparing the shakes and 3,300 minutes dedicated to blending. If they want to fully utilize all of these minutes, how many batches of each version (small or large) of the protein shake should they make?

- (a) Let  $x$  be the number of minutes the chain spends *preparing* protein shakes. Let  $y$  be the number of minutes the chain spends *blending* protein shakes. Write a system of two equations describing this situation.

- (b) How many batches of each type of shake they should produce?