

Assignment 1

This assignment, based on the content of Unit 1 of the *Study Guide*, is worth 3% of your grade. We recommend that you hand it in after you complete Unit 1. You must show all of your work in order to obtain full marks. For your convenience, each exercise mentions the section of the *Study Guide* that corresponds to the given problem.

Note: Each of the questions below is of equal weight, and each will be marked out of twenty (20) points. To gain full marks, you must show all your work.

(Section 1.1)

- 20 points** 1. Use the parametric equations to describe the solution sets of the given linear systems.

$$6x_1 + 2x_2 = -8$$

a. $3x_1 + x_2 = -4$

$$2x - y + 2z = -4$$

b. $6x - 3y + 6z = -12$

$$-4x + 2y - 4z = 8$$

(Section 1.2)

- 20 points** 2. Solve the given linear system by both Gaussian and Gauss-Jordan elimination.

$$-2b + 3c = 1$$

$$3a + 6b - 3c = -2$$

$$6a + 6b + 3c = 5$$

(Section 1.3)

- 20 points** 3. Reduce the given matrix to reduced echelon form without introducing fractions at any intermediate stage.

$$\begin{bmatrix} 2 & 1 & 3 \\ 0 & -2 & -29 \\ 3 & 4 & 5 \end{bmatrix}$$

(Section 1.3)

- 20 points** 4. Use the following matrices to compute the indicated expression if it is defined.

$$A = \begin{bmatrix} 3 & 0 \\ -1 & 2 \\ 1 & 1 \end{bmatrix}, B = \begin{bmatrix} 4 & -1 \\ 0 & 2 \end{bmatrix}, C = \begin{bmatrix} 1 & 4 & 2 \\ 3 & 1 & 5 \end{bmatrix}, D = \begin{bmatrix} 1 & 5 & 2 \\ -1 & 0 & 1 \\ 3 & 2 & 4 \end{bmatrix},$$
$$E = \begin{bmatrix} 6 & 1 & 3 \\ -1 & 1 & 2 \\ 4 & 1 & 3 \end{bmatrix}$$

- a. $2A^T + C$
- b. $D^T - E^T$
- c. $(D - E)^T$
- d. $B^T + 5C^T$
- e. $\frac{1}{2}C^T - \frac{1}{4}A$
- f. $B - B^T$
- g. $2E^T - 3D^T$
- h. $(2E^T - 3D^T)^T$
- i. $C(BA)$
- j. $\text{tr}(DE^T)$

(Section 1.4)

20 points

5. Refer to Example 5 on page 538 of the textbook:
 - a. Express Equations (5) as a homogeneous linear system of three equations in four unknowns (x , y , z , and K), and show that the solution set has one arbitrary parameter.
 - b. Find the smallest solution for which all four variables are positive integers.
 - c. Show that the solution given in the example is included among your solutions.