Math 354 - Fall 2024
Participation #7 Name: _____ netID: _____ Section: _____

Complete the following as instructed.

1. Consider the linear programming problem to maximize $z = 2x_1 + x_2$ subject to

$$\begin{aligned} 3x_1 - 2x_2 &\leq 6 \\ x_1 - 2x_2 &\leq 1 \\ x_1 \geq 0, x_2 &\geq 0 \end{aligned}$$

   (a) Draw the set of feasible solutions in the plane and determine whether the objective function is bounded on this set.

   (b) Based on your answer to part (a) and the weak-duality and duality theorems, what can you say about the dual linear programming problem?

   (c) Write down the dual linear programming problem and verify that it satisfies your conclusion to part (b).

2. Consider the linear programming problem to maximize $z = 3x_1 + 2x_2$ subject to

$$\begin{aligned} 2x_1 - 2x_2 &\leq -1 \\ -2x_1 + 2x_2 &\leq -4 \\ x_1 \geq 0, x_2 &\geq 0 \end{aligned}$$

(a) Draw the set of feasible solutions in the plane and determine whether the objective function is bounded on this set.

(b) Based on your answer to part (a) and the weak-duality and duality theorems, what can you say about the dual linear programming problem?

(c) Write down the dual linear programming problem and verify that it satisfies your conclusion to part (b).