



SECTION 3.4: SIMPLEX METHOD

1. Determine if each of the following linear programming problems is a standard maximization problem, if it is then write the initial tableau for the linear programming problem.

(a) Maximize: $P = 9x + 7y + 11z$

Subject to: $-2x + 4y - 6z \leq 1200$

$$8x + y + 3z \leq 800$$

$$5x - 10y \geq -10$$

$$x \geq 0, y \geq 0, z \geq 0$$

(b) Maximize: $P = 2x + 8y$

Subject to: $3x - 10 \leq 2y$

$$-4x + 6y \geq 8$$

$$x \geq 0, y \geq 0$$

2. State the pivot column, pivot row, and pivot element for the given simplex tableaus below.

$$(a) \left[\begin{array}{cccc|c} x & y & s_1 & s_2 & P & \text{constant} \\ 2 & -3 & 0 & 1 & 0 & 18 \\ 6 & 5 & 1 & 0 & 0 & 50 \\ \hline -4 & -1 & 0 & 0 & 1 & 0 \end{array} \right]$$

$$(b) \left[\begin{array}{cccccc|c} x & y & z & s_1 & s_2 & s_3 & P & \text{constant} \\ 1 & 0 & \frac{2}{5} & 0 & 0 & -\frac{5}{2} & 0 & 22 \\ 0 & 6 & 3 & 0 & 1 & 2 & 0 & 0 \\ 0 & \frac{3}{4} & 7 & 1 & 0 & 0 & 0 & 12 \\ \hline 0 & -2 & -9 & 0 & 0 & -4 & 1 & 340 \end{array} \right]$$

3. State the the value of each variable and whether the variable is basic or non-basic for the given simplex tableaus below. Then determine if the given simplex tableau is a final tableau.

$$(a) \begin{array}{c|cccc|c} x & y & s_1 & s_2 & P & \text{constant} \\ \hline 0 & -3 & 1 & 1 & 0 & 18 \\ 1 & 5 & \frac{1}{3} & 0 & 0 & 50 \\ \hline 0 & 1 & \frac{1}{2} & 0 & 1 & 275 \end{array}$$

$$(b) \begin{array}{c|cccccc|c} x & y & z & s_1 & s_2 & s_3 & P & \text{constant} \\ \hline 1 & 0 & 0 & \frac{2}{5} & 0 & -\frac{5}{2} & 0 & 22 \\ 0 & 6 & 0 & 3 & 1 & 2 & 0 & 0 \\ 0 & \frac{3}{4} & 1 & 7 & 0 & 0 & 0 & 12 \\ \hline 0 & -2 & 0 & -9 & 0 & -4 & 1 & 340 \end{array}$$

4. Solve the linear programming problem, using the Simplex Method, if possible.

$$\text{Maximize: } P = 9x + 7y + 11z$$

$$\text{Subject to: } -2x + 4y - 6z \leq 1200$$

$$8x + y + 3z \leq 800$$

$$5x - 10y \geq -10$$

$$x \geq 0, y \geq 0, z \geq 0$$

5. Use the Simplex Method, if possible, to solve the linear programming problem.

You have \$12,000 to invest, some in Stock A and some in Stock B. You have decided that the money invested in Stock A must be at least twice as much as that in Stock B. However, the money invested in Stock A must not be greater than \$9,000. If Stock A earn 3% annual interest, and Stock B earn 4% annual interest, how much money should you invest in each to maximize your annual interest?

SECTION 4.1: MATHEMATICAL EXPERIMENTS

1. State the sample space for each experiment:

(a) Selecting a letter at random from the word “skate” and noting the letter.

(b) A standard 30-sided die is rolled and it is noted whether the number is a multiple of 4 or is not a multiple of 4.

(c) A card is drawn from a standard deck of 52-cards, noting the color, and then a standard four-sided die is rolled, noting the number facing uppermost.

2. Consider the experiment of selecting a letter at random from the word “skate” and noting the letter.

(a) State the certain event for the experiment.

(b) Given an example of an impossible event for the experiment.

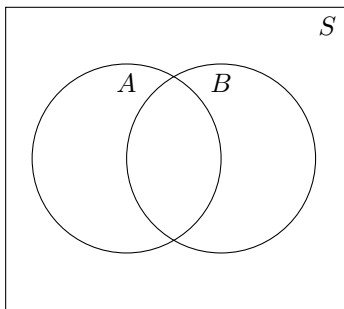
(c) Write the outcomes in the event, $J :=$ the event “a consonant is drawn.”

3. A card is drawn from a standard deck of 52-cards, noting the color, and then a standard four-sided die is rolled, noting the number facing uppermost.
- State all the simple events for the experiment.
 - State the total number of possible events.
 - Write the outcomes in the event, $M :=$ the event “a black or a number less an 3 is rolled.”
4. An experiment consists of rolling a five-sided die, noting the number showing uppermost and then spinning a spinner with five equal regions (red, blue, purple, maroon, and green), noting the color.
- Let
- $V :=$ the event “a number greater than 3 is rolled”
- $W :=$ the event “an even is rolled”
- $X :=$ the event “the spinner lands on blue”
- $Y :=$ the event “the spinner lands on a color other than green”
- $Z :=$ the event “the spinner lands on purple or maroon.”
- Write the symbolic notation for the event, H , that “a number less than or equal to 3 is rolled or the spinner lands on a color other than green, but not blue.”
 - Describe the event $Z \cup Y \cup W^C$
 - Are event V and event W mutually exclusive? Explain why or why not.

5. Let A and B be two events of the sample space, S .

Use a two-circle Venn diagram to illustrate which region(s) contain the outcomes of the resulting events.

a. $B^C \cap A$



b. $(A \cup B) \cap A^C$

