Module 3 Problem Set

Due Jan 31 by 9:59pm **Points** 15 **Submitting** an external tool
Available Jan 24 at 10pm - Mar 20 at 9:59pm about 2 months

Review Assessment Attempts

Uber, Jacques

Module 3 Problem Set

Started: 1/27/21, 4:12 pm
Last Changed: 1/28/21, 5:10 pm
Total time questions were on-screen: 155.4 minutes

Due Date: Sun 1/31/21, 9:59 pm

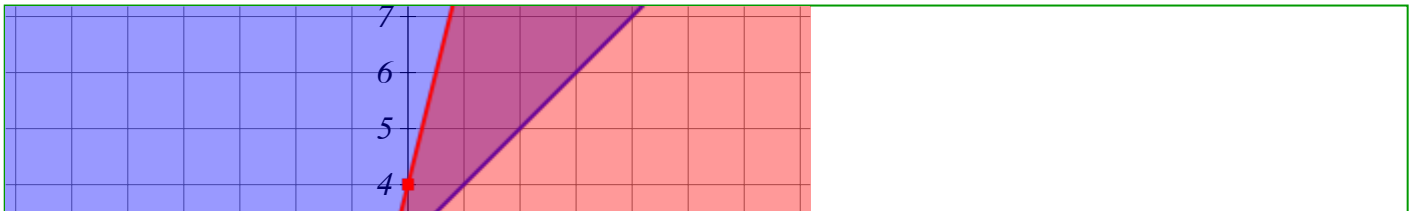
Score in Gradebook: 14.6/15

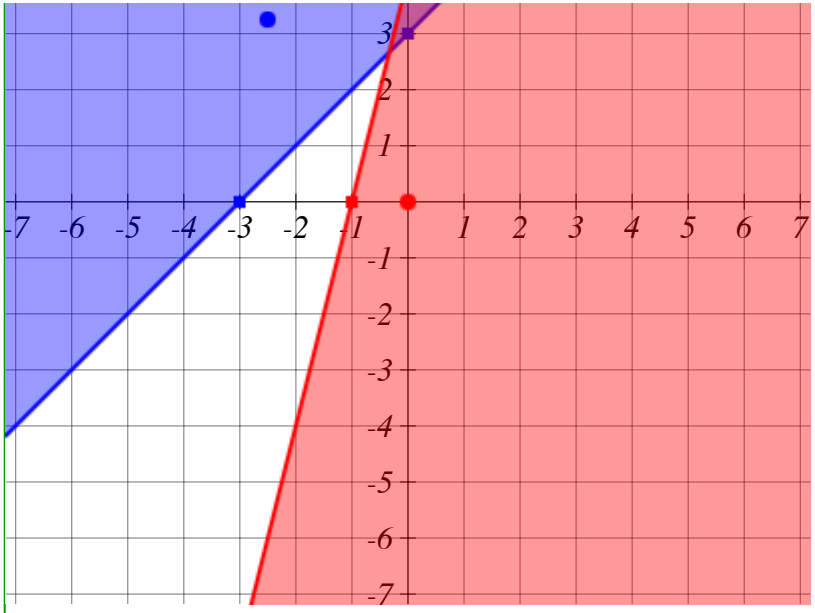
Grade is calculated on the best version of each question

Scored attempt. Score: **14.6/15.**

Question 1. Version 1*/1. Score: **1/1**

Graph: $\begin{cases} x - y \leq -3 \\ 4x - y \geq -4 \end{cases}$





Score: 1/1
Time spent on this version: 3 minutes.
Message instructor

Question 2. Version 2*/2. Score: **1/1**

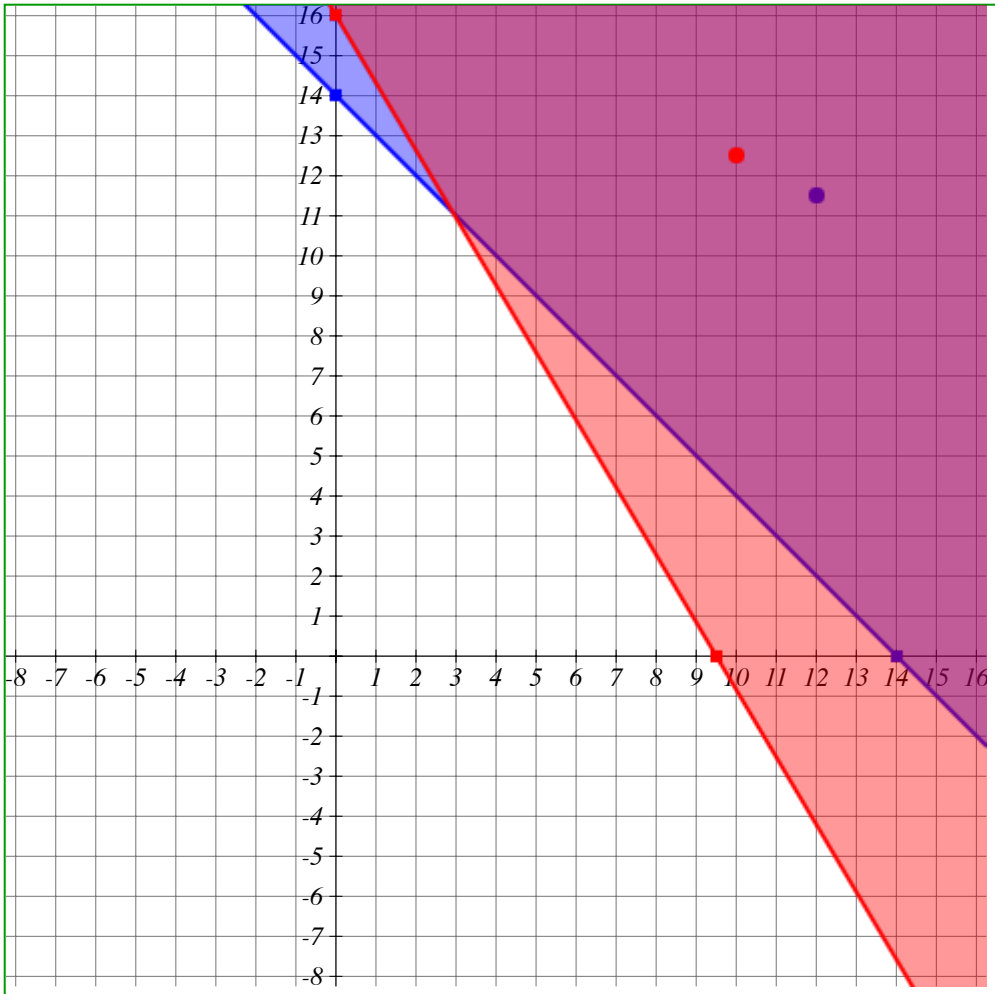
Caitlyn sells antique plates and antique spoons at the county fair. She wants to sell at least 14 antiques in total. She sells the antique plates for $2.50 and the antique spoons for $1.50. She needs to sell at least $24 worth of antiques in order to earn a profit.

a) Choose the system of inequalities that matches the given problem (where x is the number of antique plates and y is the number of antique spoons).

- $\begin{cases} x + y \geq 14 \\ 1.5x + 2.5y \geq 24 \end{cases}$
- $\begin{cases} x + y \geq 14 \\ 2.5x + 1.5y \geq 24 \end{cases}$ (selected)
- $\begin{cases} x + y \geq 24 \\ 2.5x + 1.5y \geq 14 \end{cases}$
- $\begin{cases} x + y \geq 24 \\ 1.5x + 2.5y \geq 14 \end{cases}$

b) Graph the system

b) Graph the system.



c) Will she make a profit if she sells 3 antique plates and 8 antique spoons?

Yes No

d) Will she make a profit if she sells 10 antique plates and 6 antique spoons?

No Yes

Score: 0.25/0.25 0.25/0.25 0.25/0.25 0.25/0.25
Time spent on this version: 3.6 minutes.
Message instructor

Question 3. Version 1*/1. Score: **1/1**

Rachael runs a restaurant that sells two kinds of cookies. Rachael knows the restaurant must make at least 12 and at most 52 batches of the Fluffy Deliciousness. The restaurant must also make at least 116 and at most 144 batches of the Lemon Puckers. Each batch of Fluffy Deliciousness takes 9 ounces of sugar, while each batch of Lemon Puckers requires 4 ounces of sugar. The restaurant only has 936 ounces of sugar available. Suppose each batch of Fluffy Deliciousness generates $1.55 in profit, each batch of Lemon Puckers generates $1.02, and Rachael needs to maximize profit.

Let x be the number of batches of Fluffy Deliciousness and let y be the number of batches of Lemon Puckers. Set up the linear programming model.

Maximize: $z =$ $1.55 \cdot x + 1.02 \cdot y$

Subject to:

12 $\leq x \leq$ 52

116 $\leq y \leq$ 144

$9 \cdot x + 4 \cdot y$ ≤ 936

$x, y \geq 0$

How many batches of the cookies should Rachael have the restaurant make to get the maximum profit?

Fluffy Deliciousness: 40

Lemon Puckers: 144

Maximum profit: 208.88

Score: 0.111/0.111 0.111/0.111 0.111/0.111 0.111/0.111 0.111/0.111 0.111/0.111 0.111/0.111 0.111/0.111 0.111/0.111
Time spent on this version: 10.9 minutes.
Message instructor

Question 4. Version 3*/3. Score: **0.94/1**

Use the information below to create the initial simplex tableau.

Maximize $P = 21x_1 + 4x_2$ subject to
$8x_1 + 6x_2 \leq 70$
$10x_1 + 29x_2 \leq 48$
$x_1 \geq 0,\ x_2 \geq 0$

8	6	1	0	0	70
10	28	0	1	0	48
-21	-4	0	0	1	0

Score: 0.056/0.056 0.056/0.056 0.056/0.056 0.056/0.056 0.056/0.056 0.056/0.056 0.056/0.056 0/0.056 0.056/0.056 0.056/0.056 0.056/0.056 0.056/0.056 0.056/0.056 0.056/0.056 0.056/0.056 0.056/0.056 0.056/0.056 0.056/0.056 0.056/0.056 0.056/0.056
Time spent on this version: 0.6 minutes.
Message instructor

Question 5. Version 2*/2. Score: **1/1**

Create the initial simplex tableau.

Minimize $g = 10y_1 + 6y_2 + 12y_3$ subject to

$4y_1 + y_2 + 5y_3 \geq 6$
$2y_1 + 3y_2 + y_3 \geq 7$
$2y_1 + 4y_2 + y_3 \geq 5$

$y_1 \geq 0, y_2 \geq 0, y_3 \geq 0$

4	2	2	1	0	0	0	10
1	3	4	0	1	0	0	6
5	1	1	0	0	1	0	12
-6	-7	-5	0	0	0	1	0

Score: 0.031/0.031
Time spent on this version: 5.3 minutes.
Message instructor

Question 6. Version 2*/2. Score: **1/1**

For the following objective function and constraints:
Maximize `P=9x + 5y`
subject to `{(12 x + 11 y <= 50),(5 x + 9 y <= 27),(x≥0),(y≥0):}`

Write the initial Simplex tableau:

12	11	1	0	0	50
5	9	0	1	0	27
-9	-5	0	0	1	0

Based on the initial tableau, what is the value of each variable?

`x`= 0, `y`= 0, `s_1`= 50, `s_2`= 27, `P`= 0.

The first pivot column is x. The first pivot row is Row 1.

Score: 0.125/0.125 0.125/0.125 0.125/0.125 0.125/0.125 0.125/0.125 0.125/0.125 0.125/0.125 0.125/0.125
Time spent on this version: 3 minutes.
Message instructor

Question 7. Version 1*/1. Score: **1/1**

In an investment LP problem, `x_i` = amount ($) invested in Fund `i` where `i=A, B, C`. Which option best interprets the following constraint?

`x_C >= 0.8 (x_A+x_B+x_C)`

- ○ No more than 80% of total investment should be in Fund C
- ○ Amount invested in Fund C should be at least 80% less than other Funds
- ○ Amount invested in Fund C should be at least 80% of the amount invested in other Funds
- ○ Amount invested in Fund C should be at most 80% of the amount invested in other Funds
- ○ Amount invested in Fund C should be at least 80% more than other Funds
- ◉ At least 80% of total investment should be in Fund C

Score: 1/1
Time spent on this version: 3 minutes.
Message instructor

Question 8. Version 2*/2. Score: **1/1**

Derry Coffee Shop sells two basic blends: Humberano and Kanadana.
They use two types of coffee to produce the blends: Typica and Java.

Humberano sells for $5.00 per pound and requires at least 45% Typica.
Kanadana sells for $6.25 per pound and requires no more than 30% Java.

The shop has 105 pounds of Typica and 80 pounds of Java. Typica costs $4.00 per pound while Java costs $4.25 per pound.

Let `x_(ij)` represent pounds of coffee `i` in blend `j`
`i = T, J " "` (for Typica and Java)
`j = H, K " "` (for Humberano and Kanadana)

The objective is to maximize profit.
Input the objective function coefficients in the answer boxes below:

Maximize [1] `x_(TH)` + [2.2] `x_(TK)` + [0.7] `x_(JH)` + [2] `x_(JK)`

Score: 0.25/0.25 0.25/0.25 0.25/0.25 0.25/0.25
Time spent on this version: 2.9 minutes.
Message instructor

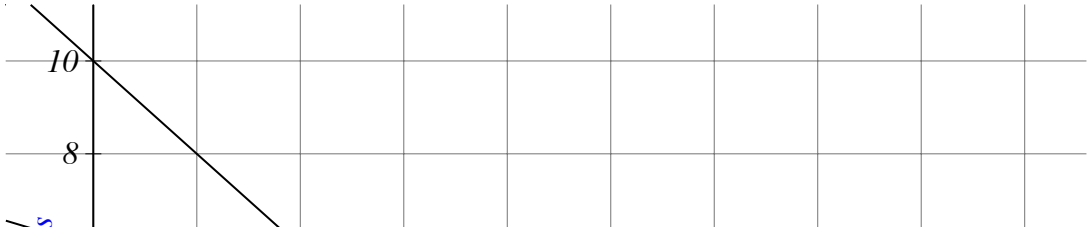
Question 9. Version 1*/1. Score: **1/1**

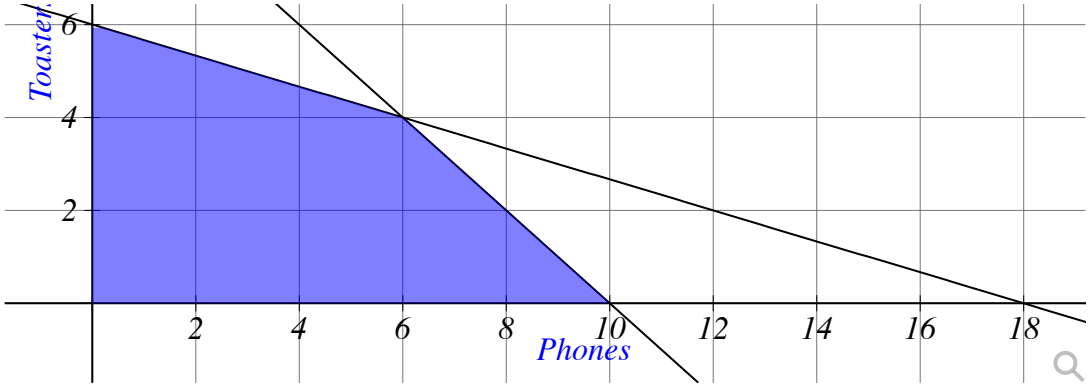
Given:

`P` = Number of Phones
`T` = Number of Toasters

Amount of stock = `10 P + 9 T`

At what point of the feasible region does the amount of stock reach its maximum?





Phones = 10

Toasters = 0

Amount of stock = 100

Score: 0.333/0.333 0.333/0.333 0.333/0.333
Time spent on this version: 1.2 minutes.
Message instructor

Question 10. Version 1*/2. Score: **0.86/1**

A company has $16,070 available per month for advertising. Newspaper ads cost $150 each and can't run more than 24 times per month. Radio ads cost $480 each and can't run more than 37 times per month at this price.

Each newspaper ad reaches 5300 potential customers, and each radio ad reaches 6250 potential customers. The company wants to maximize the number of ad exposures to potential customers.

Use `n` for number of Newspaper advertisements and `r` for number of Radio advertisements. Set up the linear programming model.

Maximize `P=` $5300 \cdot n + 6250 \cdot r$ subject to

n `<= 24`

r `<= 37`

$n \cdot 150 + r \cdot 480$ `<= $16,070`

`n, r ≥ 0`

Enter the solution below. Round to the nearest integer as needed.

Number of Newspaper ads to run is 24

Number of Radio ads to run is 25

Maximum target group exposure is 15600 people

Score: 0.14/0.14 0.14/0.14 0.14/0.14 0.14/0.14 0.15/0.15 0.15/0.15 0/0.14
Time spent on this version: 7.8 minutes.
Message instructor

Question 11. Version 2*/2. Score: **1/1**

A factory manufactures three products, A, B, and C. Each product requires the use of two machines, Machine I and Machine II. The total hours available, respectively, on Machine I and Machine II per month are 4,210 and 9,500. The time requirements and profit per unit for each product are listed below.

	A	B	C
Machine I	3	6	7
Machine II	10	10	15
Profit	$9	$15	$19

How many units of each product should be manufactured to maximize profit, and what is the maximum profit?

Start by setting up the linear programming problem, with *A*, *B*, and *C* representing the number of units of each product that are produced.

Maximize `P=` $9 \cdot A + 15 \cdot B + 19 \cdot C$

subject to:

$3 \cdot A + 6 \cdot B + 7 \cdot C$ ≤ 4,210

$10 \cdot A + 10 \cdot B + 15 \cdot C$ ≤ 9,500

A, B, C ≥ 0

Enter the solution below. If needed round numbers of items to one decimal place and profit to two decimal places.

The maximum profit is $ 11542 when the company produces:

134 units of product *A*

0 units of product *B*

544 units of product *C*

Score: 0.2/0.2 0.2/0.2 0.2/0.2 0.1/0.1 0.1/0.1 0.1/0.1 0.1/0.1
Time spent on this version: 2.2 minutes.
Message instructor

Question 12. Version 1*/1. Score: **1/1**

Samantha designs magazine covers and brochures. Each magazine requires 4 hours of brainstorming and 3 hours of layout. Each brochure requires 2 hours of brainstorming and 3 hours of layout. The company makes a profit of $170 from each magazine cover and $100 from each brochure. She has a maximum of 38 hours for brainstorming before the deadline and 36 hours for layout before the deadline.

Let `m` represent the number of magazine covers to design and let `b` represent the number of brochures to design. Set up the linear programming model for maximizing profits.

Maximize: `z =` $170 \cdot m + 100 \cdot b$

Subject to:

Write the constraint that represents the number of brainstorming hours available

$4m + 2b$ `≤` 38

Write the constraint that represents the number of layout hours available

$3m + 3b$ `≤` 36

`m, b ≥ 0`

How many of each should Samantha design in order to maximize the company's profits?

7 magazine covers

5 brochures

What is the maximum profit? $ 1690

Score: 0.125/0.125 0.125/0.125 0.125/0.125 0.125/0.125 0.125/0.125 0.125/0.125 0.125/0.125 0.125/0.125
Time spent on this version: 4.3 minutes.
Message instructor

Question 13. Version 1*/1. Score: **1/1**

The water-supply manager for Milwaukee needs to supply the city with at least 13 million gallons of potable water per day. The supply may be drawn from the local reservoir or from a pipeline to an adjacent town. The local reservoir has a maximum daily yield of 23 million gallons of potable water, and the pipeline has a maximum daily yield of 13 million gallons. By contract, the pipeline is required to supply a minimum of 9 million gallons per day. Suppose the cost for 1 million gallons of reservoir water is $430 and the cost for 1 million gallons of pipeline water is $390.

Let `p` be the number of gallons of water (in millions) drawn from the pipeline and let `r` be the number of gallons of water (in millions) drawn from the reservoir. State the objective function for minimizing costs.

Minimize: `w=` $p \cdot 390 + r \cdot 430$

How much water should the manager get from each source to minimize daily water costs for the city? What is the minimum daily water cost?

Pipeline: 13 million gallons

Reservoir: 0 million gallons

Minimum daily water cost: $ 5070

Score: 0.25/0.25 0.25/0.25 0.25/0.25 0.25/0.25
Time spent on this version: 5.2 minutes.
Message instructor

Question 14. Version 1*/1. Score: **0.8/1**

A diet is to contain at least 2650 mg vitamin C, 2130 mg Calcium, and 3140 calories every day. Two foods, a dairy-based meal and a vegan option are to fulfill these requirements. Each ounce of the dairy-based meal provides 50 mg vitamin C, 30 mg Calcium, and 40 calories. Each ounce of the vegan option provides 20 mg vitamin C, 30 mg Calcium, and 50 calories. Suppose the dairy-based meal costs $0.37 per ounce and the vegan option costs $0.35 per ounce. The goal is to meet dietary requirements while minimizing costs.

How many variables will the dual of this problem have? 3

How many constraints (excluding nonnegativity) will the dual of this problem have? 4

How many ounces of each food should be purchased to minimize costs?

Dairy-based meal: 41 ounces

Vegan option: 30 ounces

What is the minimum daily cost?

Minimum cost: $ 25.67

Score: 0.2/0.2 0/0.2 0.2/0.2 0.2/0.2 0.2/0.2
Time spent on this version: 10.5 minutes.
Message instructor

Question 15. Version 2*/2. Score: **1/1**

A lawn seed mixture contains three types of seed: bluegrass, rye, and Bermuda. The costs per pound of the three types of seed are 15 cents, 16 cents, and 3 cents, respectively. In each batch there must be at least 20% bluegrass seed, and the amount of Bermuda must be no more than 2/3 the amount of rye. To fill current orders, the company must make at least 6000 pounds of the mixture. How much of each kind of seed should be used to minimize cost? Round your answers to two decimals as needed.

Amount of bluegrass: 1200 lbs

Amount of rye: 2880 lbs

Amount of Bermuda: 1920 lbs

Minimum Cost: `$` 698.4

Score: 0.25/0.25 0.25/0.25 0.25/0.25 0.25/0.25
Time spent on this version: 1 minutes.
Message instructor

Feedback:

Return to Gradebook