Homework Assignment #1

Due Jun 12 at 11:59pm **Points** 20 **Questions** 20 **Time Limit** None
Allowed Attempts 2

Instructions

- This homework assignment will evaluate your understanding of the concepts covered in Chapter 2.
- You will need to follow course material and be able to search online code-sharing platforms to complete assignments using R.
- There is no time limit.
- You have TWO attempts to work on this homework and the highest one will be kept.
- You will be able to see the correct answers only after the last attempt.

Take the Quiz Again

Answers will be shown after your last attempt

Score for this attempt: **12.67** out of 20
Submitted Jun 10 at 8:59am
This attempt took 134 minutes.

Question 1

1 / 1 pts

Embassy Motorcycles (EM) manufactures two lightweight motorcycles designed for easy handling and safety. The EZ-Rider model has a new engine and a low profile that make it easy to balance. The Sport model is slightly larger and uses a more traditional engine. Embassy produces the engines for both models at its Des Moines, Iowa plant. Each EZ-Rider engine requires 6 hours of manufacturing time, and each Sport engine requires 3 hours of manufacturing time. The Des Moines plant has 2,100 hours of engine manufacturing time available for the next production period. Embassy's motorcycle frame supplier can supply as many EZ-Rider frames as needed. However, the Sport frame is more complex and the supplier can only provide up to 300 Sport frames for the next production period. Final assembly and testing require 2 hours for each

EZ-Rider model and 2.5 hours for each Sport model. A maximum of 1,000 hours of assembly and testing time are available for the next production period. The company's accounting department projects a profit contribution of $2,400 for each EZ-Rider produced and $1,800 for each Sport produced.

Question

Let *E* represent the EZ-Rider model and let *L* represent the Sport model. What's the objective in terms of the decision variables?
(Format: Max 10S+9D)

Max 2400E+1800L

Question 2

1 / 1 pts

Embassy Motorcycles (EM) manufactures two lightweight motorcycles designed for easy handling and safety. The EZ-Rider model has a new engine and a low profile that make it easy to balance. The Sport model is slightly larger and uses a more traditional engine. Embassy produces the engines for both models at its Des Moines, Iowa plant. Each EZ-Rider engine requires 6 hours of manufacturing time, and each Sport engine requires 3 hours of manufacturing time. The Des Moines plant has 2,100 hours of engine manufacturing time available for the next production period. Embassy's motorcycle frame supplier can supply as many EZ-Rider frames as needed. However, the Sport frame is more complex and the supplier can only provide up to 300 Sport frames for the next production period. Final assembly and testing require 2 hours for each EZ-Rider model and 2.5 hours for each Sport model. A maximum of 1,000 hours of assembly and testing time are available for the next production period. The company's accounting department projects a profit contribution of $2,400 for each EZ-Rider produced and $1,800 for each Sport produced.

Question

Let *E* represent the EZ-Rider model and let *L* represent the Sport model. What's the constraint on Engine Manufacturing Time?
(Format: 7/10S+1D<=630)

6E+3L<=2100

Question 3

1 / 1 pts

Embassy Motorcycles (EM) manufactures two lightweight motorcycles designed for easy handling and safety. The EZ-Rider model has a new engine and a low profile that make it easy to balance. The Sport model is slightly larger and uses a more traditional engine. Embassy produces the engines for both models at its Des Moines, Iowa plant. Each EZ-Rider engine requires 6 hours of manufacturing time, and each Sport engine requires 3 hours of manufacturing time. The Des Moines plant has 2,100 hours of engine manufacturing time available for the next production period. Embassy's motorcycle frame supplier can supply as many EZ-Rider frames as needed. However, the Sport frame is more complex and the supplier can only provide up to 300 Sport frames for the next production period. Final assembly and testing require 2 hours for each EZ-Rider model and 2.5 hours for each Sport model. A maximum of 1,000 hours of assembly and testing time are available for the next production period. The company's accounting department projects a profit contribution of $2,400 for each EZ-Rider produced and $1,800 for each Sport produced.

Question

Let *E* represent the EZ-Rider model and let *L* represent the Sport model. What's the constraint on Sport Maximum?

(Format: 7/10S+1D<=630)

L<=300

Question 4

1 / 1 pts

Embassy Motorcycles (EM) manufactures two lightweight motorcycles designed for easy handling and safety. The EZ-Rider model has a new

engine and a low profile that make it easy to balance. The Sport model is slightly larger and uses a more traditional engine. Embassy produces the engines for both models at its Des Moines, Iowa plant. Each EZ-Rider engine requires 6 hours of manufacturing time, and each Sport engine requires 3 hours of manufacturing time. The Des Moines plant has 2,100 hours of engine manufacturing time available for the next production period. Embassy's motorcycle frame supplier can supply as many EZ-Rider frames as needed. However, the Sport frame is more complex and the supplier can only provide up to 300 Sport frames for the next production period. Final assembly and testing require 2 hours for each EZ-Rider model and 2.5 hours for each Sport model. A maximum of 1,000 hours of assembly and testing time are available for the next production period. The company's accounting department projects a profit contribution of $2,400 for each EZ-Rider produced and $1,800 for each Sport produced.

Question

Let *E* represent the EZ-Rider model and let *L* represent the Sport model. What's the constraint on Assembly and testing time?
(Format: 7/10S+1D<=630)

2E+2.5L<=1000

Question 5

1 / 1 pts

Embassy Motorcycles (EM) manufactures two lightweight motorcycles designed for easy handling and safety. The EZ-Rider model has a new engine and a low profile that make it easy to balance. The Sport model is slightly larger and uses a more traditional engine. Embassy produces the engines for both models at its Des Moines, Iowa plant. Each EZ-Rider engine requires 6 hours of manufacturing time, and each Sport engine requires 3 hours of manufacturing time. The Des Moines plant has 2,100 hours of engine manufacturing time available for the next production period. Embassy's motorcycle frame supplier can supply as many EZ-Rider frames as needed. However, the Sport frame is more complex and the supplier can only provide up to 300 Sport frames for the next production period. Final assembly and testing require 2 hours for each EZ-Rider model and 2.5 hours for each Sport model. A maximum

of 1,000 hours of assembly and testing time are available for the next production period. The company's accounting department projects a profit contribution of $2,400 for each EZ-Rider produced and $1,800 for each Sport produced.

Question

Solve the problem in R. What is the optimal solution?

- (E, L) = (200, 250)
- (E, L) = (200, 200)
- (E, L) = (150, 250)
- (E, L) = (250, 200)

Question 6

0 / 1 pts

Embassy Motorcycles (EM) manufactures two lightweight motorcycles designed for easy handling and safety. The EZ-Rider model has a new engine and a low profile that make it easy to balance. The Sport model is slightly larger and uses a more traditional engine. Embassy produces the engines for both models at its Des Moines, Iowa plant. Each EZ-Rider engine requires 6 hours of manufacturing time, and each Sport engine requires 3 hours of manufacturing time. The Des Moines plant has 2,100 hours of engine manufacturing time available for the next production period. Embassy's motorcycle frame supplier can supply as many EZ-Rider frames as needed. However, the Sport frame is more complex and the supplier can only provide up to 300 Sport frames for the next production period. Final assembly and testing require 2 hours for each EZ-Rider model and 2.5 hours for each Sport model. A maximum of 1,000 hours of assembly and testing time are available for the next production period. The company's accounting department projects a profit contribution of $2,400 for each EZ-Rider produced and $1,800 for each Sport produced.

Question

Which constraints are binding? (Select all that apply.)

- [ ] Assembly and testing time
- [x] Sport maximum
- [x] Engine manufacturing time

Question 7

0 / 1 pts

Kelson Sporting Equipment, Inc., makes two different types of baseball gloves: a regular model and a catcher's model. The firm has 875 hours of production time available in its cutting and sewing department, 300 hours available in its finishing department, and 100 hours available in its packaging and shipping department. The production time requirements and the profit contribution per glove are given in the following table.

	Production Time (hours)			
Model	**Cutting and Sewing**	**Finishing**	**Packaging and Shipping**	**Profit/Glove**
Regular model	1	1/2	1/8	$6
Catcher's model	3/2	1/3	1/4	$7

Assuming that the company is interested in maximizing the total profit contribution, answer the following.

Question

Assume *R* is the number of units of regular model gloves and *C* is the number of units of catcher's model gloves. What is the objective in terms of the decision variables?

(Format: Max 10S+9D)

Max 6R+7C

Question 8

0 / 1 pts

Kelson Sporting Equipment, Inc., makes two different types of baseball gloves: a regular model and a catcher's model. The firm has 875 hours of production time available in its cutting and sewing department, 300 hours available in its finishing department, and 100 hours available in its packaging and shipping department. The production time requirements and the profit contribution per glove are given in the following table.

	Production Time (hours)			
Model	**Cutting and Sewing**	**Finishing**	**Packaging and Shipping**	**Profit/Glove**
Regular model	1	1/2	1/8	$6
Catcher's model	3/2	1/3	1/4	$7

Assuming that the company is interested in maximizing the total profit contribution, answer the following.

Question

Assume *R* is the number of units of regular model gloves and *C* is the number of units of catcher's model gloves. What's the constraint on Cutting and Sewing?

(Format: 7/10S+1D<=630)

1R+3/2<=875

Question 9

1 / 1 pts

Kelson Sporting Equipment, Inc., makes two different types of baseball gloves: a regular model and a catcher's model. The firm has 875 hours of

production time available in its cutting and sewing department, 300 hours available in its finishing department, and 100 hours available in its packaging and shipping department. The production time requirements and the profit contribution per glove are given in the following table.

	Production Time (hours)			
Model	**Cutting and Sewing**	**Finishing**	**Packaging and Shipping**	**Profit/Glove**
Regular model	1	1/2	1/8	$6
Catcher's model	3/2	1/3	1/4	$7

Assuming that the company is interested in maximizing the total profit contribution, answer the following.

Question

Find the optimal solution using R. How many gloves of each model should Kelson manufacture?

- Regular model = 500 gloves
- Catcher's model = 150 gloves

Answer 1:

500

Answer 2:

150

Question 10

1 / 1 pts

Kelson Sporting Equipment, Inc., makes two different types of baseball gloves: a regular model and a catcher's model. The firm has 875 hours of production time available in its cutting and sewing department, 300 hours

available in its finishing department, and 100 hours available in its packaging and shipping department. The production time requirements and the profit contribution per glove are given in the following table.

	Production Time (hours)			
Model	**Cutting and Sewing**	**Finishing**	**Packaging and Shipping**	**Profit/Glove**
Regular model	1	1/2	1/8	$6
Catcher's model	3/2	1/3	1/4	$7

Assuming that the company is interested in maximizing the total profit contribution, answer the following.

Question

What is the total profit contribution (in dollars) Kelson can earn with the given production quantities?

4050

Question 11

0.67 / 1 pts

Kelson Sporting Equipment, Inc., makes two different types of baseball gloves: a regular model and a catcher's model. The firm has 875 hours of production time available in its cutting and sewing department, 300 hours available in its finishing department, and 100 hours available in its packaging and shipping department. The production time requirements and the profit contribution per glove are given in the following table.

	Production Time (hours)			
Model	**Cutting and Sewing**	**Finishing**	**Packaging and Shipping**	**Profit/Glove**
Regular model	1	1/2	1/8	$6

Catcher's model	3/2	1/3	1/4	$7

Assuming that the company is interested in maximizing the total profit contribution, answer the following.

Question

How many hours of production time will be scheduled in each department?

- Cutting and sewing = 875 hours
- Finishing = 300 hours
- Packaging and shipping = 100 hours

Answer 1:

875

Answer 2:

300

Answer 3:

100

Question 12

1 / 1 pts

Kelson Sporting Equipment, Inc., makes two different types of baseball gloves: a regular model and a catcher's model. The firm has 875 hours of production time available in its cutting and sewing department, 300 hours available in its finishing department, and 100 hours available in its packaging and shipping department. The production time requirements and the profit contribution per glove are given in the following table.

Model	Production Time (hours)

	Cutting and Sewing	Finishing	Packaging and Shipping	Profit/Glove
Regular model	1	1/2	1/8	$6
Catcher's model	3/2	1/3	1/4	$7

Assuming that the company is interested in maximizing the total profit contribution, answer the following.

Question

What is the slack time (in hours) in each department?

- Cutting and sewing = 150 hours
- Finishing = 0 hours
- Packaging and shipping = 0 hours

Answer 1:

150

Answer 2:

0

Answer 3:

0

Question 13

0 / 1 pts

Blair & Rosen, Inc. (B&R), is a brokerage firm that specializes in investment portfolios designed to meet the specific risk tolerances of its clients. A client who contacted B&R this past week has a maximum of $75,000 to invest. B&R's investment advisor decides to recommend a

portfolio consisting of two investment funds: an Internet fund and a Blue Chip fund. The Internet fund has a projected annual return of 9%, whereas the Blue Chip fund has a projected annual return of 7%. The investment advisor requires that at most $50,000 of the client's funds should be invested in the Internet fund. B&R services include a risk rating for each investment alternative. The Internet fund, which is the more risky of the two investment alternatives, has a risk rating of 6 per thousand dollars invested. The Blue Chip fund has a risk rating of 4 per thousand dollars invested. For example, if $10,000 is invested in each of the two investment funds, B&R's risk rating for the portfolio would be 6(10) + 4(10) = 100.

Finally, B&R developed a questionnaire to measure each client's risk tolerance. Based on the responses, each client is classified as a conservative, moderate, or aggressive investor. Suppose that the questionnaire results classified the current client as a moderate investor. B&R recommends that a client who is a moderate investor limit their portfolio to a maximum risk rating of 360.

Question

What is the recommended investment portfolio (in dollars) for this client?

Internet fund = $ $30,000

Blue chip fund = $ $45,000

Answer 1:

$30,000

Answer 2:

$45,000

Question 14

0 / 1 pts

Blair & Rosen, Inc. (B&R), is a brokerage firm that specializes in investment portfolios designed to meet the specific risk tolerances of its

clients. A client who contacted B&R this past week has a maximum of $75,000 to invest. B&R's investment advisor decides to recommend a portfolio consisting of two investment funds: an Internet fund and a Blue Chip fund. The Internet fund has a projected annual return of 9%, whereas the Blue Chip fund has a projected annual return of 7%. The investment advisor requires that at most $50,000 of the client's funds should be invested in the Internet fund. B&R services include a risk rating for each investment alternative. The Internet fund, which is the more risky of the two investment alternatives, has a risk rating of 6 per thousand dollars invested. The Blue Chip fund has a risk rating of 4 per thousand dollars invested. For example, if $10,000 is invested in each of the two investment funds, B&R's risk rating for the portfolio would be 6(10) + 4(10) = 100.

Finally, B&R developed a questionnaire to measure each client's risk tolerance. Based on the responses, each client is classified as a conservative, moderate, or aggressive investor. Suppose that the questionnaire results classified the current client as a moderate investor. B&R recommends that a client who is a moderate investor limit their portfolio to a maximum risk rating of 360.

Question

What is the annual return (in dollars) for the portfolio?

$5,850

Question 15

0 / 1 pts

Blair & Rosen, Inc. (B&R), is a brokerage firm that specializes in investment portfolios designed to meet the specific risk tolerances of its clients. A client who contacted B&R this past week has a maximum of $75,000 to invest. B&R's investment advisor decides to recommend a portfolio consisting of two investment funds: an Internet fund and a Blue Chip fund. The Internet fund has a projected annual return of 9%, whereas the Blue Chip fund has a projected annual return of 7%. The investment advisor requires that at most $50,000 of the client's funds should be invested in the Internet fund. B&R services include a risk rating

for each investment alternative. The Internet fund, which is the more risky of the two investment alternatives, has a risk rating of 6 per thousand dollars invested. The Blue Chip fund has a risk rating of 4 per thousand dollars invested. For example, if $10,000 is invested in each of the two investment funds, B&R's risk rating for the portfolio would be 6(10) + 4(10) = 100.

Finally, B&R developed a questionnaire to measure each client's risk tolerance. Based on the responses, each client is classified as a conservative, moderate, or aggressive investor. Suppose that the questionnaire results classified the current client as a moderate investor. B&R recommends that a client who is a moderate investor limit their portfolio to a maximum risk rating of 360.

Question

Suppose that a second client with $75,000 to invest has been classified as an aggressive investor. B&R recommends that the maximum portfolio risk rating for an aggressive investor is 400. What is the recommended investment portfolio (in dollars) for this aggressive investor?

Internet fund = $ $50,000

Blue chip fund = $ $25,000

Answer 1:

$50,000

Answer 2:

$25,000

Question 16

1 / 1 pts

Blair & Rosen, Inc. (B&R), is a brokerage firm that specializes in investment portfolios designed to meet the specific risk tolerances of its clients. A client who contacted B&R this past week has a maximum of $75,000 to invest. B&R's investment advisor decides to recommend a

portfolio consisting of two investment funds: an Internet fund and a Blue Chip fund. The Internet fund has a projected annual return of 9%, whereas the Blue Chip fund has a projected annual return of 7%. The investment advisor requires that at most $50,000 of the client's funds should be invested in the Internet fund. B&R services include a risk rating for each investment alternative. The Internet fund, which is the more risky of the two investment alternatives, has a risk rating of 6 per thousand dollars invested. The Blue Chip fund has a risk rating of 4 per thousand dollars invested. For example, if $10,000 is invested in each of the two investment funds, B&R's risk rating for the portfolio would be 6(10) + 4(10) = 100.

Finally, B&R developed a questionnaire to measure each client's risk tolerance. Based on the responses, each client is classified as a conservative, moderate, or aggressive investor. Suppose that the questionnaire results classified the current client as a moderate investor. B&R recommends that a client who is a moderate investor limit their portfolio to a maximum risk rating of 360.

Question

Suppose that a second client with $75,000 to invest has been classified as an aggressive investor. B&R recommends that the maximum portfolio risk rating for an aggressive investor is 400. Discuss what happens to the portfolio under the aggressive investor strategy.

The aggressive investor places the _____ amount of funds in the high-risk but high-return Internet fund resulting in an annual return (in dollars) of $ _____.

- minimum; 5,850
- minimum; 6,250
- maximum; 5,850
- maximum; 6,250

Question 17

1 / 1 pts

Blair & Rosen, Inc. (B&R), is a brokerage firm that specializes in investment portfolios designed to meet the specific risk tolerances of its clients. A client who contacted B&R this past week has a maximum of $75,000 to invest. B&R's investment advisor decides to recommend a portfolio consisting of two investment funds: an Internet fund and a Blue Chip fund. The Internet fund has a projected annual return of 9%, whereas the Blue Chip fund has a projected annual return of 7%. The investment advisor requires that at most $50,000 of the client's funds should be invested in the Internet fund. B&R services include a risk rating for each investment alternative. The Internet fund, which is the more risky of the two investment alternatives, has a risk rating of 6 per thousand dollars invested. The Blue Chip fund has a risk rating of 4 per thousand dollars invested. For example, if $10,000 is invested in each of the two investment funds, B&R's risk rating for the portfolio would be 6(10) + 4(10) = 100.

Finally, B&R developed a questionnaire to measure each client's risk tolerance. Based on the responses, each client is classified as a conservative, moderate, or aggressive investor. Suppose that the questionnaire results classified the current client as a moderate investor. B&R recommends that a client who is a moderate investor limit their portfolio to a maximum risk rating of 360.

Question

Suppose that a third client with $75,000 to invest has been classified as a conservative investor. B&R recommends that the maximum portfolio risk rating for a conservative investor is 260. Develop the recommended investment portfolio (in dollars) for the conservative investor.

Internet fund = $ 0

Blue chip fund = $ 65,000

Answer 1:

0

Answer 2:

65,000

Question 18

0 / 1 pts

Blair & Rosen, Inc. (B&R), is a brokerage firm that specializes in investment portfolios designed to meet the specific risk tolerances of its clients. A client who contacted B&R this past week has a maximum of $75,000 to invest. B&R's investment advisor decides to recommend a portfolio consisting of two investment funds: an Internet fund and a Blue Chip fund. The Internet fund has a projected annual return of 9%, whereas the Blue Chip fund has a projected annual return of 7%. The investment advisor requires that at most $50,000 of the client's funds should be invested in the Internet fund. B&R services include a risk rating for each investment alternative. The Internet fund, which is the more risky of the two investment alternatives, has a risk rating of 6 per thousand dollars invested. The Blue Chip fund has a risk rating of 4 per thousand dollars invested. For example, if $10,000 is invested in each of the two investment funds, B&R's risk rating for the portfolio would be 6(10) + 4(10) = 100.

Finally, B&R developed a questionnaire to measure each client's risk tolerance. Based on the responses, each client is classified as a conservative, moderate, or aggressive investor. Suppose that the questionnaire results classified the current client as a moderate investor. B&R recommends that a client who is a moderate investor limit their portfolio to a maximum risk rating of 360.

Question

Suppose that a second client with $75,000 to invest has been classified as an aggressive investor. B&R recommends that the maximum portfolio risk rating for an aggressive investor is 400. Discuss the interpretation of the slack variable for the total investment fund constraint.

The slack (in dollars) for the total investment fund constraint is $_____. This means that investing all $75,000 in the less risky Blue Chip fund is _____ for the conservative investor.

- 10,000; appropriate

10,000; too risky

10,000; not risky enough

Question 19

1 / 1 pts

The Kartick Company is trying to determine how much of each of the two products to produce over the coming planning period. There are three departments, A, B, and C, with limited labor hours available in each department. Each product must be processed by each department and the per-unit requirements for each product, labor hours available, and per-unit profit are shown below.

Labor required in each department

Department	Product (hours/unit)		Labor Hours Available
	Product 1	Product 2	
A	1.00	0.30	100
B	0.30	0.12	36
C	0.15	0.56	50
Profit Contribution	$33.00	$24.00	

A linear program for this situation is as follows.

Let x_1 = the amount of product 1 to produce.

Let x_2 = the amount of product 2 to produce.

Maximize	$33x_1 + 24x_2$			
s.t.				
	$1.0x_1 + 0.30x_2$	$\leq$	100	Department A
	$0.30x_1 + 0.12x_2$	$\leq$	36	Department B
	$0.15x_1 + 0.56x_2$	$\leq$	50	Department C

$x_1, x_2 \geq 0$

Mr. Kartick (the owner) used trial and error with a spreadsheet model to arrive at a solution. His proposed solution is $x_1 = 75$ and $x_2 = 60$, as shown in the following tables. He said he felt his proposed solution is optimal.

Consider the following tables a representation of an Excel spreadsheet.

Kartick

Data			
Department	**Prod 1**	**Prod 2**	**Hours Available**
A	1.00	0.30	100
B	0.30	0.12	36
C	0.15	0.56	50
Per unit Contribution	$33.00	$24.00	

Decisions

	Prod 1	**Prod 2**
Quantity	75	60

Model

Department	**Hours Used**	**Unused Hours**
A	93	7
B	29.7	6.3
C	44.85	5.15
Contribution	$3,915.00	

Question

Is his solution optimal? Without solving the problem, explain why you believe this solution is optimal or not optimal.

His solution is not optimal, it results in unused hours, thus more products can still be made.

His solution is optimal, it results in a minimum number of unused hours.

His solution is optimal, it results in a maximum number of hours used.

His solution is optimal, it results in a maximum profit contribution.

His solution is not optimal, it results in more hours used than what is available.

Question 20

1 / 1 pts

Julia Johnson has been accumulating savings for years to put toward her children's future college educations. She would now like to set up a college savings fund for her two children. The college savings fund has two investment options: (1) a bond fund and (2) a stock fund. The projected returns over the life of the investments are 8% for the bond fund and 11% for the stock fund. Whatever portion of her accumulated savings that she finally decides to commit to the college savings fund, she wants to invest at least 30% of that amount in the bond fund. In addition, she wants to select a mix that will enable her to obtain a total return of at least 9%.

Question

Formulate a linear programming model that can be used to determine the percentage (as a decimal) that should be allocated to each of the possible investment alternatives. Assume B is the percentage (as a decimal) of funds invested in the bond fund and S is the percentage (as a decimal) of funds invested in the stock fund.

Solve the problem using R. What is the value of the objective function at the optimal solution?

- 0.546 at (B, S) = (0.6, 0.7)
- 0.101 at (B, S) = (0.3, 0.7)
- 1.101 at (B, S) = (1.2, 2.3)
- 0.052 at (B, S) = (0.7, 0.2)

Quiz Score: **12.67** out of 20