

UNIVERSITY OF MASSACHUSETTS

Isenberg School of Management

Department of Finance and Operations Management

FOMGT 353-Introduction to Management Science

Homework #2 – Graphical LP's.

Show your work completely and in an organized manner to receive maximum credit. Correct answers without supporting calculations or diagrams will not receive credit. Incorrect answers using the correct method and a good presentation will receive substantial credit.

My name is:

1. Consider the following linear program:

Maximize $x + 2y$

Subject to

$$x \leq 5$$

$$y \leq 4$$

$$2x + 2y = 12$$

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

- a. Graph the constraints and bounds.
 - b. Identify the feasible region.
 - c. What are the extreme points of the feasible region?
 - d. Find the optimal solution using the graphical procedure.
2. 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 Lady-Sport

model is slightly larger, uses a more traditional engine and is specifically designed to appeal to women riders.

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 Lady-Sport engine requires 3 hours of manufacturing time. The Des Moines plant has 2100 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 Lady-Sport frame is more complex and the supplier can only provide up to 280 Lady-Sport frames for the next production period.

Final assembly and testing requires 2 hours for each EZ-Rider model and 2.5 hours for each Lady-Sport model. A maximum of 1000 hours of assembly and testing time are available for the next production period.

The company's accounting department projects a profit contribution of \$2400 for each EZ-Rider produced and \$1800 for each Lady-Sport produced.

- a. Formulate a linear programming model that can be used to determine the number of units of each model that should be produced in order to maximize the total contribution to profit.
- b. Solve the problem graphically. What is the optimal solution?
- c. Which constraints are binding?