

# MAT 135P - Math for Liberal Arts Plus

## Linear Programming Content

Required course textbook: *Contemporary Mathematics* from OpenStax

### Linear Programming Just-In-Time Math Skills Support

#### Graphing:

| Know the Following Definitions                         | Contemporary Mathematics  | Suggested HW or Practice Problems |
|--|---|-----------------------------------|
| Table of Values  | Sec 5.5, pg. 382-383 (they only do this for linear equations, I don't see it for more general algebraic equations)            | N/A                               |
| Independent Variable                                   | Sec 5.7, pg. 429 (in the context of functions)  | N/A                               |
| Dependent Variable                                     | Sec 5.7, pg. 429 (in the context of functions)  | N/A                               |
| Ordered Pair   | Sec 5.5, pg. 377  | N/A                               |
| x-axis and y-axis                                      | Sec 5.5, pg. 376-377  | N/A                               |
| Linear equation in two variables                       | Sec 5.5, pg. 379-380  | N/A                               |
| Graph  | Sec 5.5, pg. 380  | N/A                               |
| x-intercept and y-intercept                            | Sec 5.8, pg. 447-449  | N/A                               |
| Slope  | Sec 5.8, pg. 451-454  | N/A                               |
| Slope-intercept form of an equation of a straight line | Sec 5.8, pg. 454-456  | N/A                               |
| The point-slope form of an equation of a straight line | Sec 8.8, pg. 922 ( <b>I don't see point-slope in CH 5, but in 8.8 they make it sound like it's been covered previously?</b> ) | N/A                               |
| Linear inequality in two variables                     | Sec 5.5, pg. 385-386  | N/A                               |

| <b>Be Able To</b>  | <b>Contemporary Mathematics</b>  | <b>Suggested HW or Practice Problems</b>   |
|--|--|--|
| Create a table of values from an algebraic equation  | Sec 5.5, pg. 382-383 (they only do this for linear equations, I don't see it for more general algebraic equations) | N/A  |
| Plot ordered pairs   | Sec 5.5 pg. 377-379  | YOUR TURN 5.39, pg. 379<br><br>Sec 5.5 Exercises, pg. 397 # 1  |
| Determine if given ordered pairs are solutions of linear equations in two                  | Sec 5.5, pg. 380-382   | YOUR TURN 5.40, pg. 381-382<br><br>Sec 5.5 Exercises, pg. 398-400 # 2-13                                   |
| Complete table of values for linear equations in two variables                             | Sec 5.5, pg. 382-383   | YOUR TURN 5.41, pg. 383<br><br>Sec 5.5 Exercises, pg. 400 # 14-20  |
| Construct graphs by plotting points for linear equations in one variable and two variables | Sec 5.5, pg. 382-383   | YOUR TURN 5.41, pg. 383<br><br>Sec 5.5 Exercises, pg. 400 # 14-20  |
| Find the x-intercept and y-intercept   | Sec 5.8, pg. 449-451   | YOUR TURN 5.70, pg. 449-450<br><br>Sec 5.8 Exercises, pg. 466-468 # 1-4                                    |
| Construct a graph using the x-intercept and y-intercept                                    | Sec 5.8, pg. 450-451   | YOUR TURN 5.71, pg. 451<br><br>Sec 5.8 Exercises, pg. 468 # 5-12   |
| Find the slopes given two points   | Sec 5.8, pg. 452-454<br><br>Sec 5.8, pg. 457-461 (horizontal and vertical lines)                                   | YOUR TURN 5.72, 5.73, pg. 453-454<br><br>Sec 5.8 Exercises, pg. 468-472 # 13-24                            |
| Construct a graph using the slope and y-intercept  | Sec 5.8, pg. 456-457<br><br>Sec 5.8, pg. 457-461 (horizontal and vertical lines)                                   | YOUR TURN 5.75, pg. 457<br><br>Sec 5.8 Exercises, pg. 472 # 33-44 (includes horizontal and vertical lines) |

| <b>Be Able To</b>   | <b>Contemporary Mathematics</b>   | <b>Suggested HW or Practice Problems</b>   |
|---|---|--|
| Find the equation of a line given the slope and y-intercept | Sec 5.8, pg. 454-456 (this is reversed – given equations, find slope & y-int)<br><br>Sec 5.8, pg. 457-461 (horizontal and vertical lines) | YOUR TURN 5.74, pg. 456<br><br>Sec 5.8 Exercises, pg. 472 # 25-32 (reversed – given equations, find slope and y-intercept) |
| Find the equation of a line given one point and a slope     | N/A   | N/A  |
| Find the equation of a line given two points                | N/A   | N/A  |
| Construct a graph of a linear inequality in two variables   | Sec 5.5, pg. 385-393  | YOUR TURN 5.43-5.45, pg. 386-393<br><br>Sec 5.5 Exercises, pg. 403 # 34-44   |

### **Systems of Equations and Inequalities:**

| <b>Know the Following Definitions</b>                    | <b>Contemporary Mathematics</b> | <b>Suggested HW or Practice Problems</b>                                     |
|--|---------------------------------|--|
| Substitution Method                                      | Sec 5.9, pg. 479-480            | YOUR TURN 5.84, pg. 480<br><br>Sec 5.9 Exercises, pg. 489-490 # 13-20, 29-36 |
| Addition/Elimination Method                              | Sec 5.9, pg. 480-482            | YOUR TURN 5.85, pg. 482<br><br>Sec 5.9 Exercises, pg. 489-490 # 21-28, 29-36 |
| <b>Be Able To</b>  | <b>Contemporary Mathematics</b> | <b>Suggested HW or Practice Problems</b>                                     |
| Solve systems of equations by graphing                   | Sec 5.9, pg. 476-479            | YOUR TURN 5.83, pg. 479<br><br>Sec 5.9 Exercises, pg. 489-490 # 5-12, 29-36  |
| Solve systems of equations using the substitution method | Sec 5.9, pg. 479-480            | YOUR TURN 5.84, pg. 480<br><br>Sec 5.9 Exercises, pg. 489-490 # 13-20, 29-36 |

| <b>Be Able To</b>  | <b>Contemporary Mathematics</b> | <b>Suggested HW or Practice Problems</b>                                    |
|--|---------------------------------|---|
| Solve systems of equations using the addition/elimination method | Sec 5.9, pg. 480-482            | YOUR TURN 5.85, pg. 482<br><br>Sec 5.9 Exercises, pg. 490 # 21-36           |
| Graph systems of linear inequalities                             | Sec 5.10, pg. 492-499           | YOUR TURN 5.90-5.94, pg. 493-499<br><br>Sec 5.10 Exercises, pg. 517 # 14-30 |

## **Linear Programming Applications**

| <b>Know the Following Definitions</b>   | <b>Contemporary Mathematics</b>          | <b>Suggested HW or Practice Problems</b>   |
|---|--|--|
| Linear Programming problem  | Sec 5.11, pg. 518-519                    | N/A  |
| Constraints   | Sec 5.11, pg. 520                        | N/A  |
| Profit equation   | Sec 5.11, pg. 519-520                    | N/A  |
| Feasible region   | Sec 5.11, pg. 521-523                    | N/A  |
| Corner points   | Sec 5.11, pg. 521-524                    | N/A  |
| <b>Be Able To</b>   | <b>Contemporary Mathematics</b>          | <b>Suggested HW or Practice Problems</b>   |
| From its associated chart, write the constraints of a linear programming problem as linear inequalities | Sec 5.11, pg. 520                        | YOUR TURN 5.97-5.99, pg. 520-521<br><br>Sec 5.11 Exercises, pg. 528-529 # 6-9, 14-25 |
| List two implied constraints in every linear programming problem  | Sec 5.11, pg. 522, Example 5.100, Step 3 | YOUR TURN 5.100, pg. 524<br><br>Sec 5.11 Exercises, pg. 528-529 # 6-9, 14-25         |
| Formulate a profit equation for a linear programming problem when given the per-units profits           | Sec 5.11, pg. 519-524                    | YOUR TURN 5.96, pg. 519  |
| Draw the graph of a line in a coordinate-axis system  | Sec 5.11, pg. 521-524 (and Sec 5.5)      | YOUR TURN 5.100, pg. 524<br><br>Sec 5.11 Exercises, pg. 528-529 # 10-25              |
| Graph a linear inequality in a coordinate-axis system   | Sec 5.11, pg. 521-524 (and Sec 5.10)     | YOUR TURN 5.100, pg. 524<br><br>Sec 5.11 Exercises, pg. 528-529 # 10-125             |

| Be Able To  | Contemporary Mathematics | Suggested HW or Practice Problems  |
|---|--------------------------|--|
| Determine by a substitution process whether a point with given coordinates is contained in the graph of a linear inequality | Sec 5.10, pg. 491-492    | YOUR TURN 5.89, pg. 492  |
| Indicate the feasible region for a linear programming problem by shading the graphical intersection of its constraints      | Sec 5.11, pg. 521-524    | YOUR TURN 5.100, pg. 524<br>Sec 5.11 Exercises, pg. 529 # 10-25          |
| Locate the corner points of a feasible region from its graph  | Sec 5.11, pg. 521-524    | YOUR TURN 5.100, pg. 524<br>Sec 5.11 Exercises, pg. 526-529 # 1-5, 14-25 |
| Evaluate the profit function at each corner point of a feasible region  | Sec 5.11, pg. 521-524    | YOUR TURN 5.100, pg. 524<br>Sec 5.11 Exercises, pg. 526-529 # 1-5, 14-25 |
| Apply the corner point theorem to determine the maximum profit for a linear programming problem                             | Sec 5.11, pg. 521-524    | YOUR TURN 5.100, pg. 524<br>Sec 5.11 Exercises, pg. 528-529 # 14-25      |
| Interpret the corner point producing the profit maximum as the solution to the corresponding linear programming problem     | Sec 5.11, pg. 521-524    | YOUR TURN 5.100, pg. 524<br>Sec 5.11 Exercises, pg. 528-529 # 14-25      |