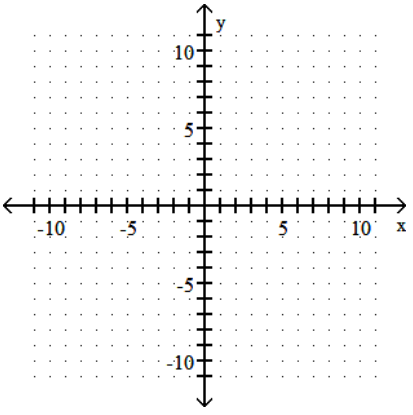
Math 1324 - Exam 2 Review

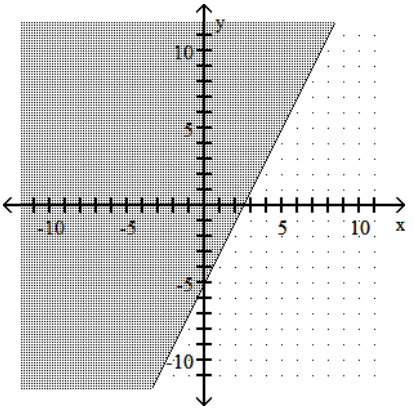
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Graph the inequality.

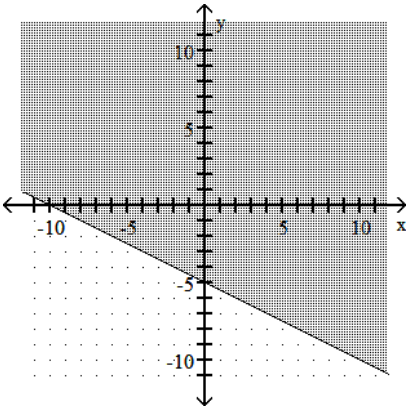
1) $2x + y \leq -5$ 1) _____



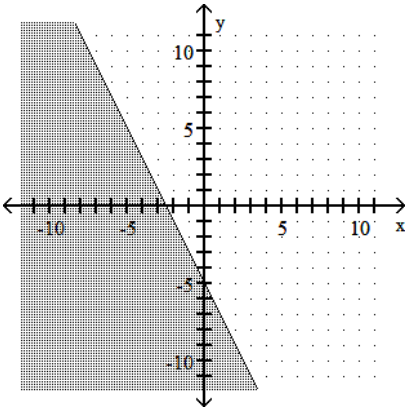
A)



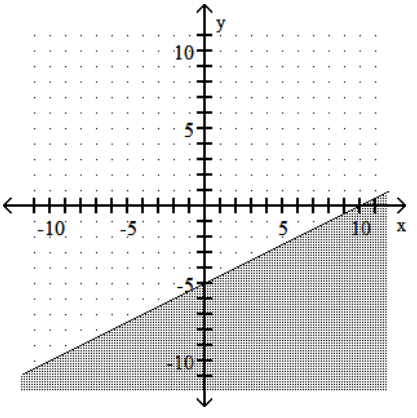
B)



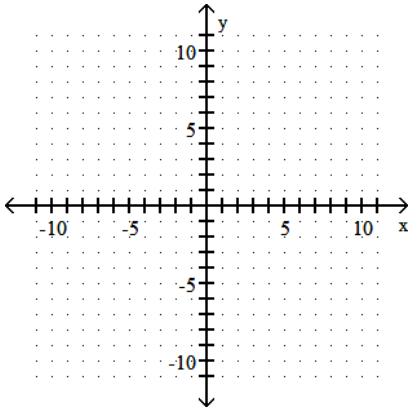
C)



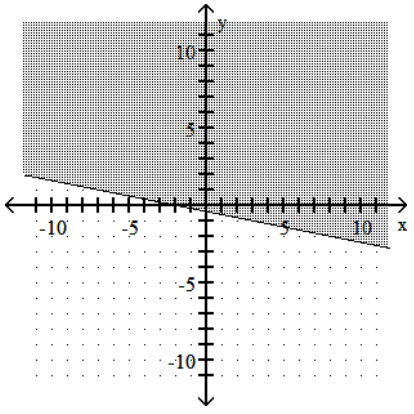
D)



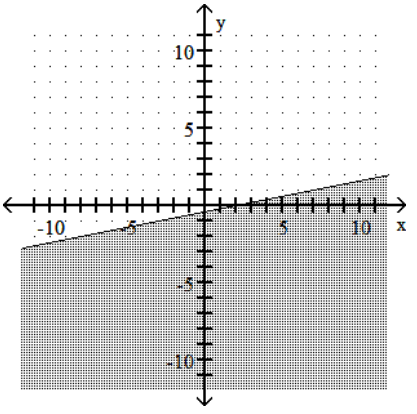
2) $x + 5y \geq -2$ 2) _____



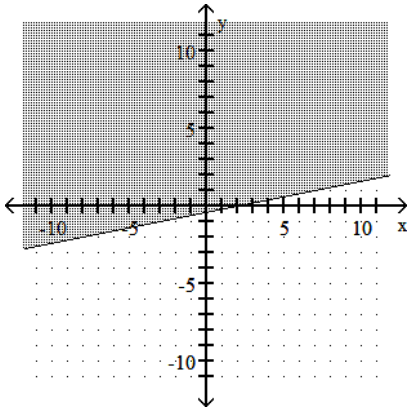
A)



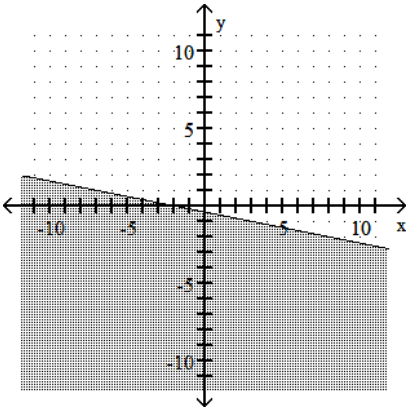
B)



C)



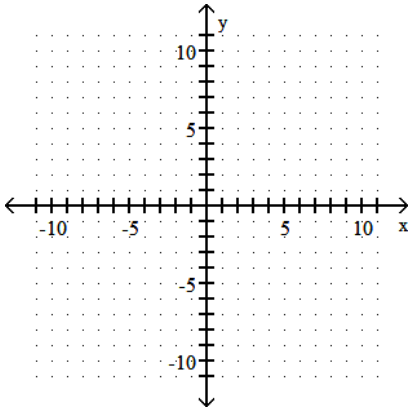
D)



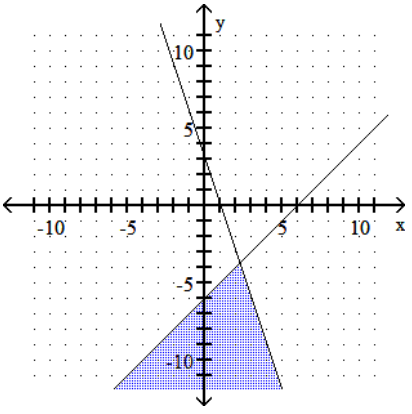
Graph the solution set of the system of linear inequalities and indicate whether the solution region is bounded or unbounded.

3) $y \leq -3x + 3$
$y \geq x - 6$

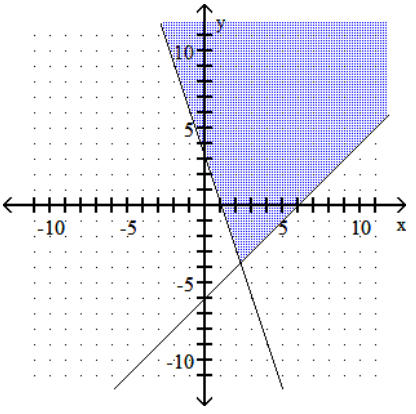
3) _____



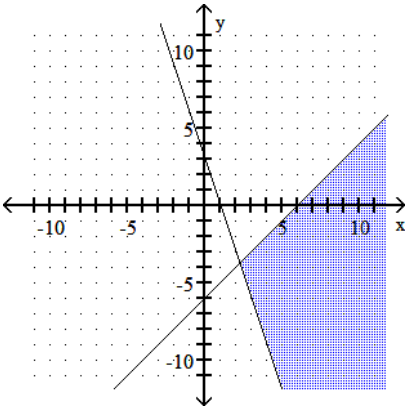
A) Unbounded



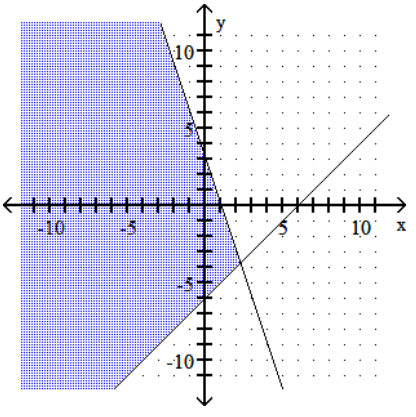
B) Bounded



C) Bounded

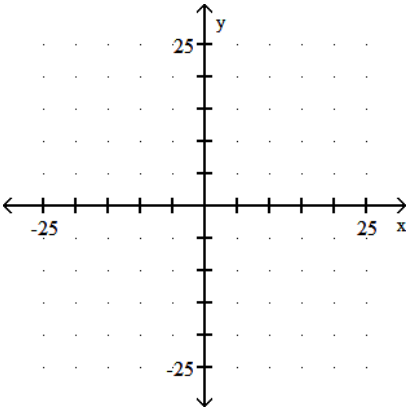


D) Unbounded

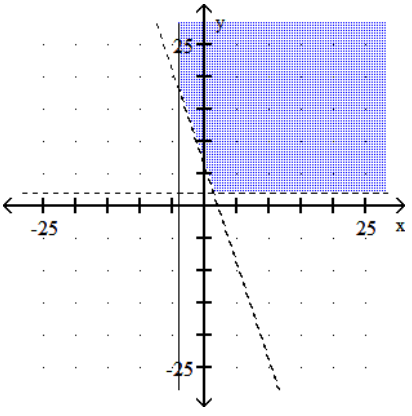


4) $x \leq -4$
$y > 2$
$3x + y < 6$

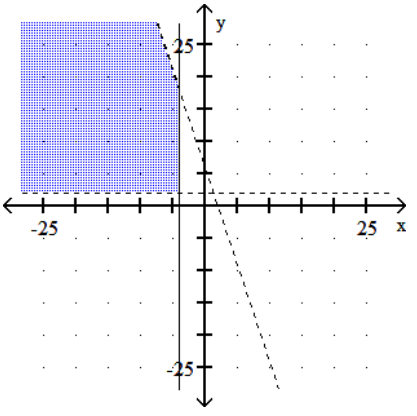
4) _____



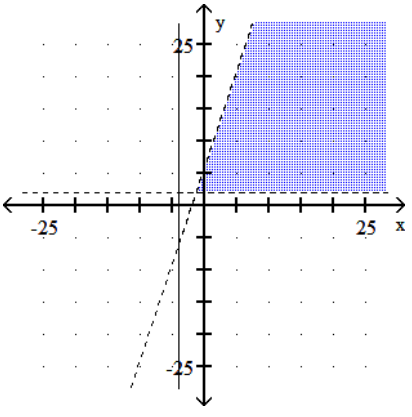
A) Bounded



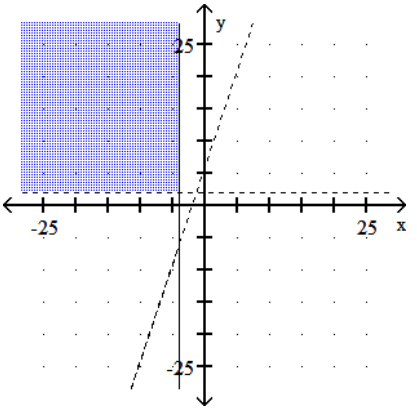
B) Unbounded



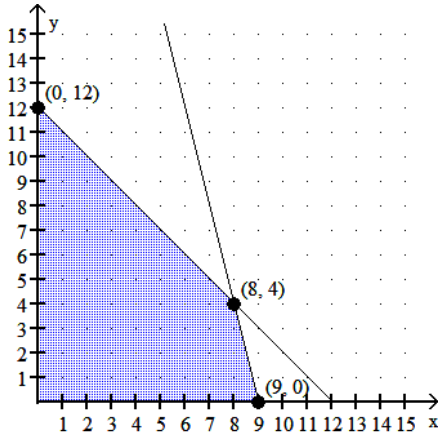
C) Bounded



D) Unbounded



Solve the linear programming problem by determining the feasible region on the graph below and testing the corner points:

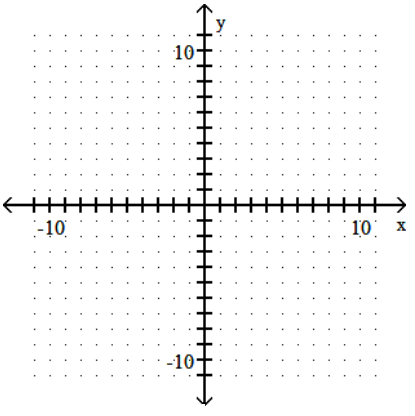


5) Maximize P = x + y 5) _____

A) Max P = 9 at x = 9 and y = 0, at x = 8 and y = 4
B) Max P = 5 at x = 3 and y = 2
C) Max P = 8 at x = 5 and y = 3
D) Max P = 12 at x = 0 and y = 12, at x = 8 and y = 4

Use graphical methods to solve the linear programming problem.

6) Minimize $z = 2x + 4y$ 6) _____
subject to: $x + 2y \geq 10$
$3x + y \geq 10$
$x \geq 0$
$y \geq 0$



A) Minimum of 20 when x = 10 and y = 0
B) Minimum of 0 when x = 0 and y = 0
C) Minimum of 20 when x = 2 and y = 4, as well as when x = 10 and y = 0, and all points in between
D) Minimum of 20 when x = 2 and y = 4

Provide an appropriate response.

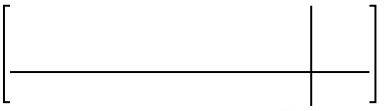
7) Write the simplex tableau, label the columns and rows for the linear programming problem: 7) _____

Maximize $P = 4x_1 + x_2$ subject to

$2x_1 + 5x_2 \le 9$

$3x_1 + 3x_2 \le 2$

$x_1, x_2 \ge 0$



A)

x_1	x_2	s_1	s_2	P	
2	5	1	0	0	9
3	3	0	1	0	2
-4	-1	0	0	1	0

B)

x_1	x_2	s_1	s_2	P	
2	5	1	0	0	2
3	3	0	1	0	9
-4	-1	0	0	1	0

C)

x_1	x_2	s_1	s_2	P	
2	5	1	0	0	9
3	3	0	1	0	2
4	1	0	0	1	0

D)

x_1	x_2	s_1	s_2	P	
2	5	1	0	0	2
3	3	0	1	0	9
4	1	0	0	1	0

8) Write the simplex tableau, label the columns and rows, underline the pivot element, and identify the entering and exiting variables for the linear programming problem: 8) _____

Maximize $P = 5x_1 + 3x_2$

subject to

$3x_1 + 8x_2 \le 5$

$3x_1 + 5x_2 \le 6$

$-8x_1 + 6x_2 \le 32$

$6x_2 \le 3$

$x_1, x_2 \ge 0$

A) Enter

	x_1	x_2	s_1	s_2	s_3	s_4	P	
s_1	3	<u>8</u>	1	0	0	1	0	8
s_2	3	5	0	1	0	0	0	6
s_3	-8	6	0	0	1	0	0	32
s_4	0	6	0	0	0	1	0	3
P	-5	-3	0	0	0	0	1	0

Exit

B) Exit

	x_1	x_2	s_1	s_2	s_3	s_4	P	
s_1	3	8	1	0	0	0	0	6
s_2	3	5	0	1	0	0	0	6
s_3	-8	<u>6</u>	0	0	1	0	1	32
s_4	0	6	0	0	0	1	0	3
P	-5	-3	0	0	0	0	1	0

Enter

C) Enter

	x_1	x_2	s_1	s_2	s_3	s_4	P	
s_1	3	8	1	0	0	0	0	5
Exit s_2	3	5	0	1	0	0	0	6
s_3	-8	6	0	0	1	0	0	32
s_4	0	6	0	0	0	1	0	3
P	-5	-3	0	0	0	0	1	0

D) Exit

	x_1	x_2	s_1	s_2	s_3	s_4	P	
s_1	3	8	1	0	0	1	0	5
Enter s_2	3	5	0	1	0	0	0	6
s_3	-8	6	0	0	1	0	0	32
s_4	0	6	0	0	0	1	0	3
P	-5	-3	0	0	0	0	1	32

Introduce slack variables as necessary, and write the initial simplex tableau for the problem.

9) Find $x_1 \geq 0$ and $x_2 \geq 0$ such that 9) _____

$2x_1 + 5x_2 \leq 19$

$3x_1 + 3x_2 \leq 18$

and $z = 4x_1 + x_2$ is maximized.

A)

x_1	x_2	s_1	s_2	z	
2	5	1	0	0	18
3	3	0	1	0	19
-4	-1	0	0	1	0

B)

x_1	x_2	s_1	s_2	z	
2	5	1	0	0	18
3	3	0	1	0	19
4	1	0	0	1	0

C)

x_1	x_2	s_1	s_2	z	
2	5	1	0	0	19
3	3	0	1	0	18
4	1	0	0	1	0

D)

x_1	x_2	s_1	s_2	z	
2	5	1	0	0	19
3	3	0	1	0	18
-4	-1	0	0	1	0

Pivot once about the circled element in the simplex tableau, and read the solution from the result.

10) 10) _____

x_1	x_2	x_3	s_1	s_2	z	
②	1	4	1	0	0	48
2	4	1	0	1	0	32
-1	-3	-2	0	0	1	0

A) $x_1 = 24$, $s_2 = -16$, $z = 24$; $x_2, x_3, s_1 = 0$

B) $x_1 = 48$, $s_2 = 16$, $z = 48$; $x_2, x_3, s_1 = 0$

C) $x_1 = 48$, $s_2 = -16$, $z = -48$; $x_2, x_3, s_1 = 0$

D) $x_1 = 24$, $s_2 = -16$, $z = -24$; $x_2, x_3, s_2 = 0$

Provide an appropriate response.

11) Solve the following linear programming problem using the simplex method: 11) _____

Maximize $P = 7x_1 + 2x_2 + x_3$

subject to:

$$x_1 + 5x_2 + 7x_3 \le 8$$
$$x_1 + 4x_2 + 11x_3 \le 9$$
$$x_1, x_2, x_3 \ge 0$$

A) Max P = 56 when $x_1 = 8, x_2 = 0, x_3 = 0$

B) Max P = 9 when $x_1 = 1, x_2 = 1, x_3 = 0$

C) Max P = 0 when $x_1 = 0, x_2 = 0, x_3 = 8$

D) Max P = 63 when $x_1 = 9, x_2 = 0, x_3 = 0$

Find the transpose of the matrix.

12) 12) _____

$$\begin{bmatrix} 1 & 6 & 9 & 3 \\ 1 & 7 & 8 & 6 \end{bmatrix}$$

A) $\begin{bmatrix} 3 & 6 \\ 6 & 1 \\ 3 & 6 \\ 9 & 8 \end{bmatrix}$

B) $\begin{bmatrix} 1 & 1 \\ 7 & 6 \\ 8 & 9 \\ 6 & 3 \end{bmatrix}$

C) $\begin{bmatrix} 1 & 7 & 8 & 6 \\ 1 & 6 & 9 & 3 \end{bmatrix}$

D) $\begin{bmatrix} 1 & 1 \\ 6 & 7 \\ 9 & 8 \\ 3 & 6 \end{bmatrix}$

Provide an appropriate response.

13) Formulate the dual problem for the linear programming problem: 13) _____

Minimize
$C = 3x_1 + x_2$
subject to
$$2x_1 + 3x_2 \ge 60$$
$$x_1 + 4x_2 \ge 40$$
$$x_1, x_2 \ge 0$$

A) Maximize $P = 60y_1 + 40y_2$
subject to
$$2y_1 + y_2 \ge 3$$
$$3y_1 + 4y_2 \ge 1$$
$$y_1, y_2 \ge 0$$

B) Maximize $P = 60y_1 + 40y_2$
subject to
$$2y_1 + y_2 \le 3$$
$$3y_1 + 4y_2 \le 1$$
$$y_1, y_2 \ge 0$$

C) Maximize $P = 3y_1 + y_2$
subject to
$$2y_1 + y_2 \le 3$$
$$3y_1 + 4y_2 \ge 1$$
$$y_1, y_2 \ge 0$$

D) Maximize $P = 3y_1 + y_2$
subject to
$$2y_1 + y_2 \le 3$$
$$3y_1 + 4y_2 \le 1$$
$$y_1, y_2 \ge 0$$

14) Formulate the dual problem for the linear programming problem: 14) _____

Minimize $C = 6x_1 + x_2 + 5x_3$
subject to
$8x_1 + x_2 \geq 2$
$8x_2 + 5x_3 \geq 16$
$x_1, x_2, x_3 \geq 0$

A) Maximize $P = 2y_1 + 16y_2$
subject to
$8y_1 \geq 6$
$y_1 + 8y_2 \geq 1$
$5y_2 \leq 5$
$y_1, y_2 \geq 0$

B) Maximize $P = 16y_1 + 2y_2$
subject to
$8y_1 \leq 6$
$y_1 + 8y_2 \leq 1$
$5y_2 \leq 5$
$y_1, y_2 \geq 0$

C) Maximize $P = 2y_1 + 16y_2$
subject to
$8y_1 \leq 6$
$y_1 + 8y_2 \leq 1$
$5y_2 \leq 5$
$y_1, y_2 \leq 0$

D) Maximize $P = 2y_1 + 16y_2$
subject to
$8y_1 \leq 6$
$y_1 + 8y_2 \leq 1$
$5y_2 \leq 5$
$y_1, y_2 \geq 0$

15) Solve the linear programming problem by using the simplex method. 15) _____

Minimize $f = 5x + 3y$
subject to: $2x + 3y \geq 9$
$2x + y \geq 11$
$x \geq 0, y \geq 0$

A) $x = 5, y = 0, f = 25$

B) $x = 5, y = 1, f = 28$

C) $x = \frac{11}{2}, y = 0, f = \frac{55}{2}$

D) $x = 0, y = 11, f = 33$

Solve the problem.

16) A summer camp wants to hire counselors and aides to fill its staffing needs at minimum cost. The average monthly salary of a counselor is $2400 and the average monthly salary of an aide is $1100. The camp can accommodate up to 45 staff members and needs at least 30 to run properly. They must have at least 10 aides, and may have up to 3 aides for every 2 counselors. How many counselors and how many aides should the camp hire to minimize cost? 16) _____

A) 35 counselors and 10 aides
B) 27 counselors and 18 aides
C) 18 counselors and 12 aides
D) 12 counselors and 18 aides

Answer Key
Testname: 1324-SU17-REVIEW2

1) C
2) A
3) A
4) B
5) D
6) C
7) A
8) C
9) D
10) A
11) A
12) D
13) B
14) D
15) C
16) D