Section 8.7 Solutions

1) Maximize: z = 3x + 2y
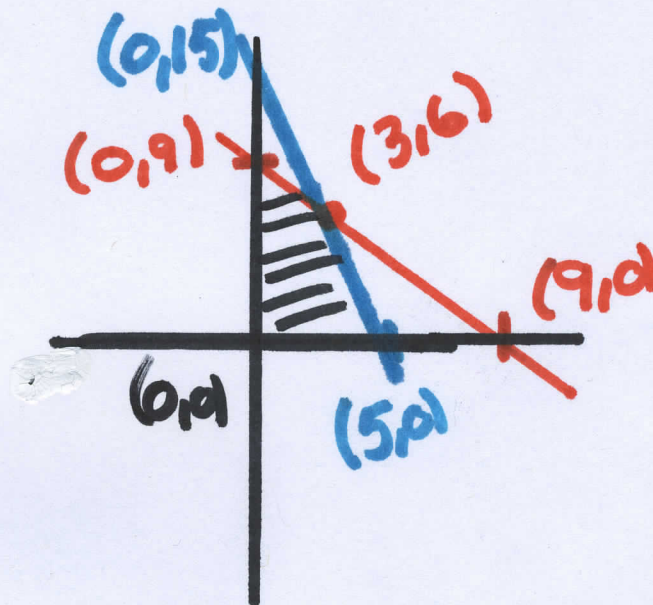
Subject to:

$x + y \le 9$

$3x + y \le 15$

$x \ge 0, \quad y \ge 0$ (Constraints same as problem 31 section 8.6)

This is the graph that was
created from problem 31 sec 8.6

Corner points (0,9) (3,6) (5,0) (0,0)

VALUE OF CORNER POINT IN OBJECTIVE FUNCTION

(0,9) $z = 3(0) + 2(9) = 18$

(3,6) $z = 3(3) + 2(6) = 21$

(5,0) $z = 3(5) + 2(0) = 15$

(0,0) $z = 3(0) + 2(0) = 0$

(3,6)

ANSWER: Maximum value of z is 21, occurs at (3,6)
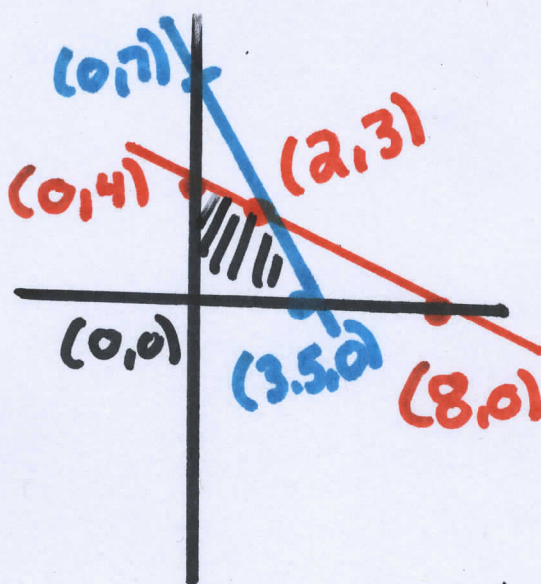
3) Maximize: z = 5x + 6y

Subject to:
$x + 2y \leq 8$
$2x + y \leq 7$
$x \geq 0, \quad y \geq 0$ (Constraints same as problem 33 section 8.6)

This graph was created during the Solution of problem 33 section 8.6

CORNER POINTS

(0,4)   (2,3) (0,0) (3.5,0)

VALUE OF CORNER POINT IN OBJECTIVE EQUATION

(0,4): $z = 5(0) + 6(4) = 24$
(2,3): $z = 5(2) + 6(3) = 28$
(0,0): $z = 5(0) + 6(0) = 0$
(3.5,0): $z = 5(3.5) + 6(0) = 17.5$

ANSWER: MAXIMUM VALUE OF z is 28, OCCURS AT (2,3)

5) Minimize: z = 30x + 25y
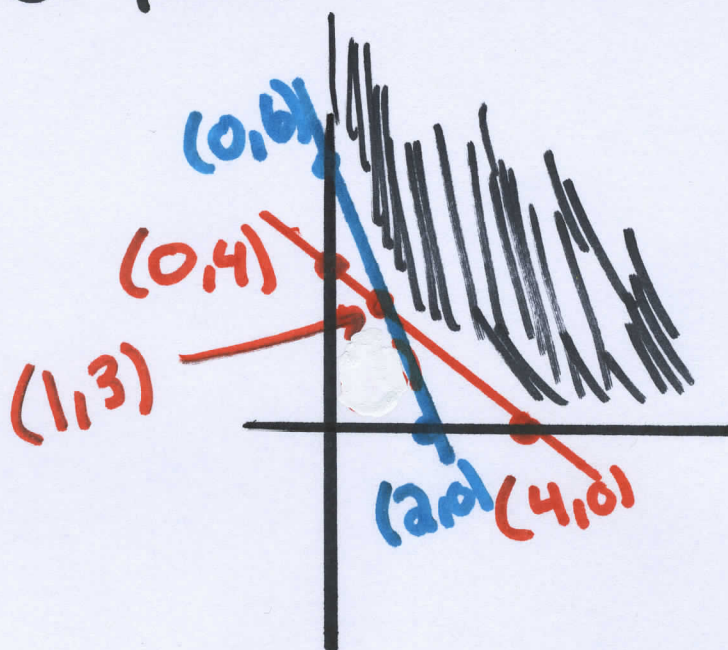
Subject to:

$x + y \geq 4$

$3x + y \geq 6$

$x \geq 0, \quad y \geq 0$ (Constraints same as problem 35 section 8.6)

This graph WAS created during the Solution of problem 35 section 8.6

(0,6)

(0,4)

(1,3)

(2,0) (4,0)

CORNER POINTS

(0,6) (1,3) (4,0)

VALUE OF CORNER POINT IN OBJECTIVE FUNCTION

(0,6):   Z = 30(0) + 25(6) = 150

(1,3):   Z = 30(1) + 25(3) = 105

(4,0):   Z = 30(4) + 25(0) = 120

ANSWER! minimum value of Z is 105, occurs at (1,3)

7) Minimize: $z = x + 3y$
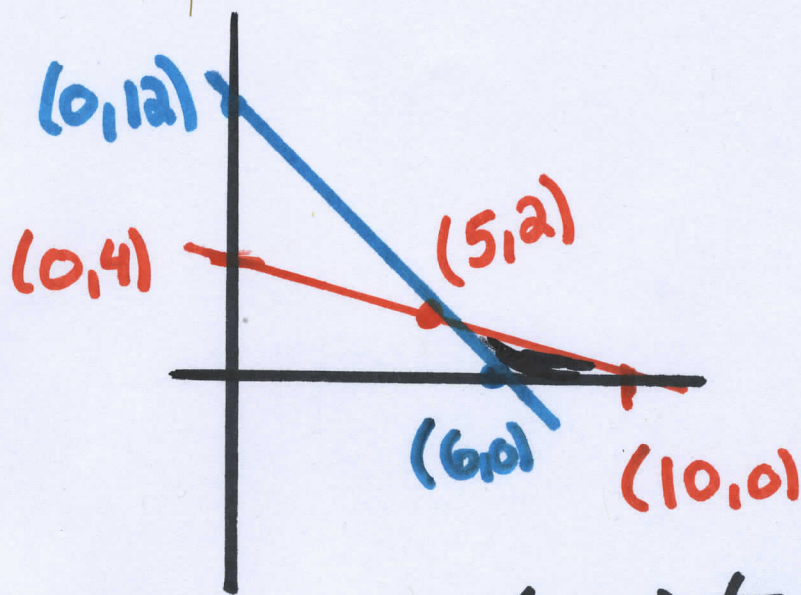
Subject to:

$2x + 5y \le 20$

$2x + y \ge 12$

$x \ge 0, \quad y \ge 0$ (Constraints same as problem 37 section 8.6)

This graph was created during the Solution of problem 37 Section 8.6

$(0,12)$

$(0,4)$ $(5,2)$

$(6,0)$ $(10,0)$

Corner points $(6,0)$ $(5,2)$ $(10,0)$

VALUE OF CORNER POINTS IN OBJECTIVE EQUATION

$(6,0)$ $z = 6 + 3(0) = 6$

$(5,2)$ $z = 5 + 3(2) = 11$

$(10,0)$ $z = 10 + 3(0) = 10$

ANSWER! Minimum VALUE of z is 6, occurs at $(6,0)$
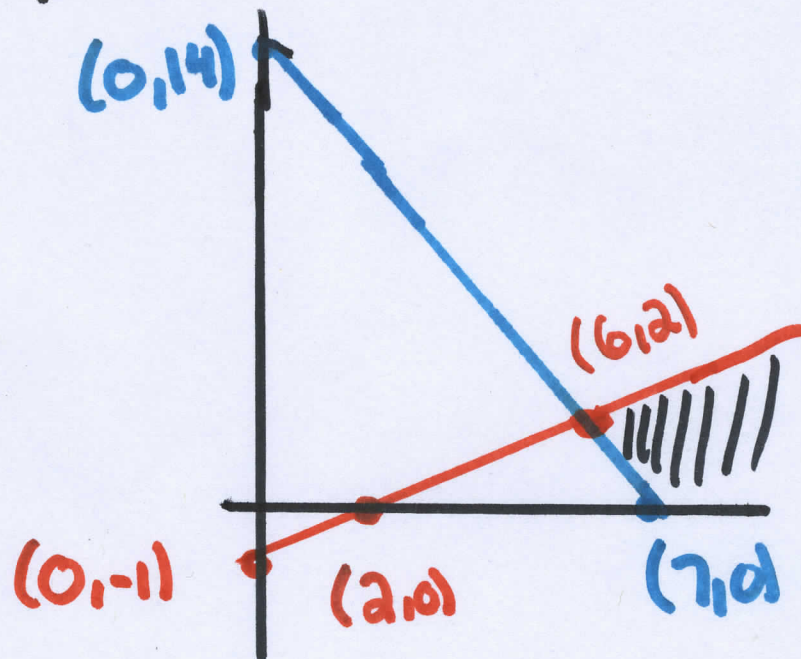
9) Minimize: $z = 5x + 4y$

Subject to:
$x - 2y \leq 2$
$2x + y \geq 14$
$x \geq 0, \quad y \geq 0$ (Constraints same as problem 39 section 8.6)

This graph was created during the
Solution of problem 39, Section 8.6

(0,14)

(6,2)

(0,-1)   (2,0)   (7,0)

Corner points (6,2) (7,0)

Value of corner point in Target Equation
(Objective)

$(6,2): z = 5(6) + 4(2) = 38$
$(7,0): z = 5(7) + 4(0) = 35$

Answer: Minimum value of z is 35,
occurs at (7,0)