

Section 5.3 – Practice Questions

$$\begin{array}{r} 21 \\ \times 45 \\ \hline 105 \\ 84 \\ \hline 945 \end{array}$$

Determine which of the ordered pairs given produces the maximum values

1. $C = 12x + 10y$
 (0, 0), (7, 0), (5, 3), (0, 8.5)

$$C = 12x + 10y$$

$$= 12(0) + 10(0) = 0$$

$$= 12(7) + 10(0) = 84$$

$$= 12(5) + 10(3) = 90$$

$$= 12(0) + 10(8.5) = 85$$

max $C = 90$ at $(5, 3)$

2. $C = 50x + 45y$
 (0, 0), (0, 21), (15, 0), (7.5, 12.5)

$$C = 50x + 45y$$

$$= 50(0) + 45(0) = 0$$

$$= 50(0) + 45(21) = 945$$

$$= 50(15) + 45(0) = 750$$

$$= 7.5 \times 50 + 45 \times 12.5 = 945$$

max $C = 945$ at $(0, 21)$

3. $C = 16x + 8y$
 (1, 2), (2, 1), (0, 4), (3, 0)

$$C = 16x + 8y$$

$$= 16(1) + 8(2) = 32$$

$$= 16(2) + 8(1) = 40$$

$$= 16(0) + 8(4) = 32$$

$$= 16(3) + 8(0) = 48$$

max $C = 48$ at $(3, 0)$

4. $C = 3x + 5y$
 (4, 3), (1, 5), (7, 1), (5, 2)

$$C = 3x + 5y$$

$$= 3(4) + 5(3) = 27$$

$$= 3(1) + 5(5) = 28$$

$$= 3(7) + 5(1) = 27$$

$$= 3(5) + 5(2) = 25$$

max $C = 28$ at $(1, 5)$

Determine which of the ordered pairs given produces the minimum value

5. $C = 8x + 15y$
 (0, 20), (35, 0), (5, 15), (12, 11)

$$C = 8x + 15y$$

$$= 8(0) + 15(20) = 300$$

$$= 8(35) + 15(0) = 280$$

$$= 8(5) + 15(15) = 265$$

$$= 8(12) + 15(11) = 261$$

min $C = 261$ at $(12, 11)$

6. $C = 75x + 80y$
 (0, 9), (10, 0), (4, 5), (5, 4)

$$C = 75x + 80y$$

$$= 75(0) + 80(9) = 720$$

$$= 75(10) + 80(0) = 750$$

$$= 75(4) + 80(5) = 700$$

$$= 75(5) + 80(4) = 695$$

min $C = 695$ at $(5, 4)$

7. $C = 3x - 10y$
 (5, 1), (2, 0), (10, 3), (8, 2)

$$C = 3x - 10y$$

$$= 3(5) - 10(1) = 5$$

$$= 3(2) - 10(0) = 6$$

$$= 3(10) - 10(3) = 0$$

$$= 3(8) - 10(2) = 4$$

min $C = 0$ at $(10, 3)$

8. $C = 0.3x - y$
 (10, 1), (20, 4), (7, 0), (40, 11)

$$C = 0.3x - y$$

$$= 0.3(10) - 1 = 2$$

$$= 0.3(20) - 4 = 2$$

$$= 0.3(7) - 0 = 2.1$$

$$= 0.3(40) - 11 = 1$$

min $C = 1$ at $(40, 11)$

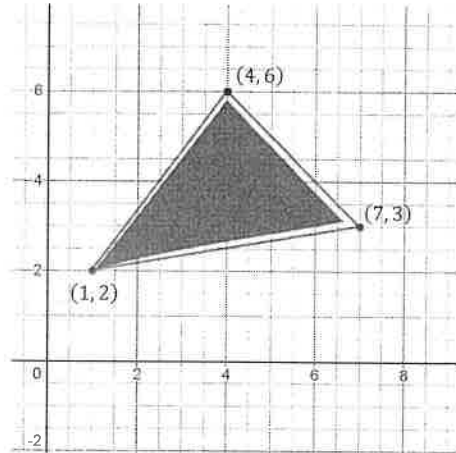
Find the max and min values of the given function and indicated region where they occur

9. $C = 2x - 3y$

$$\begin{aligned} &= 2(4) - 3(6) = -10 \\ &= 2(1) - 3(2) = -4 \\ &= 2(7) - 3(3) = 5 \end{aligned}$$

Max: $(7, 3)$

Min: $(4, 6)$

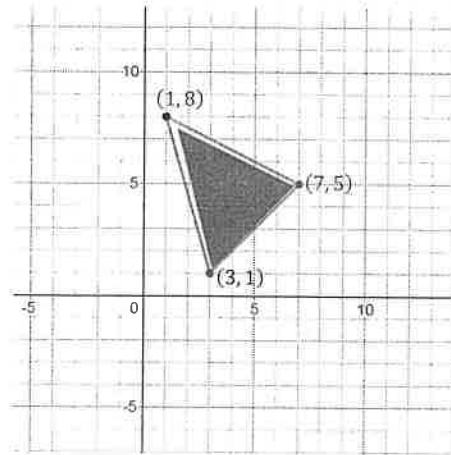


10. $C = x + 3y$

$$\begin{aligned} &= 1 + 8 \times 3 = 25 \\ &= 7 + 5 \times 3 = 22 \\ &= 3 + 1 = 4 \end{aligned}$$

Max: $(1, 8)$

Min: $(3, 1)$

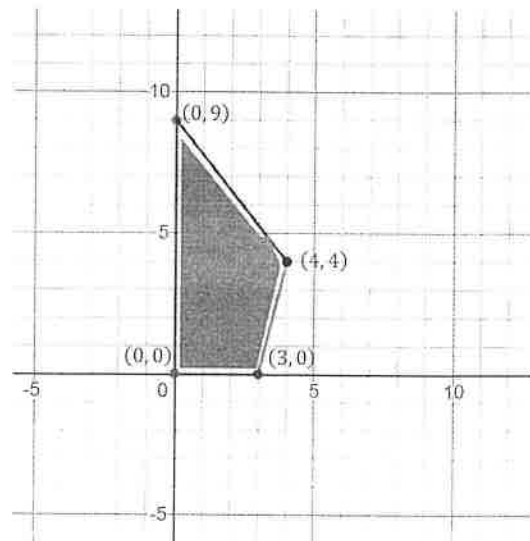


11. $C = 3x - 2y$

$$\begin{aligned} &= 0 - 2 \times 9 = -18 \\ &= 4 \times 3 - 4 \times 2 = 4 \\ &= 0 - 0 = 0 \\ &= 9 - 0 = 9 \end{aligned}$$

Max: $(3, 0)$

Min: $(0, 9)$

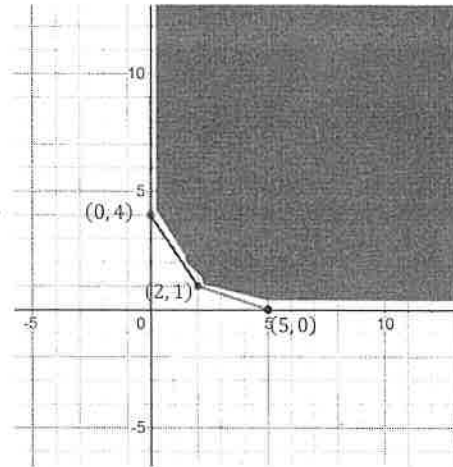


12. $C = 2x + 4y$

$= 0 \times 2 + 4 \times 4 = 16$

$= 4 + 4 = 8$

$= 10 + 0 = 10$



Max: no max

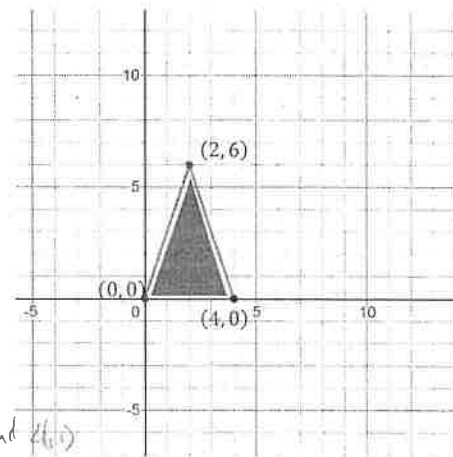
Min: line between (4,0) and (2,1)

13. $C = 3x + y$

$= 3 \times 2 + 6 = 12$

$= 0 + 0 = 0$

$= 12 + 0 = 12$



Max: between (2,6) and (4,0)

Min: (0,0)

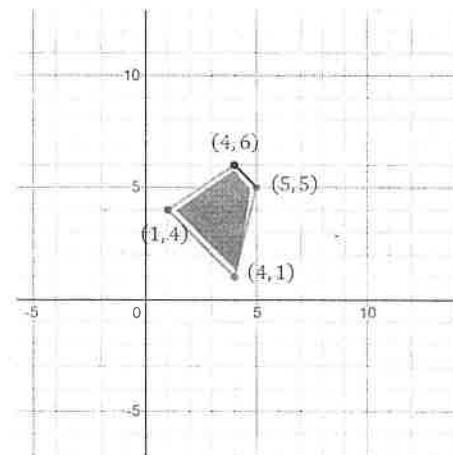
14. $C = 3x + 3y$

$C = 12 + 18 = 30$

$= 15 + 15 = 30$

$= 3 \times 1 + 3 \times 4 = 15$

$= 4 \times 3 + 3 = 15$

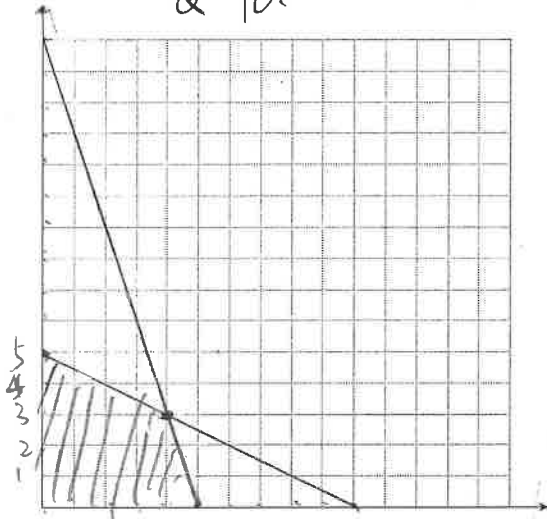


Max: between (4,6) and (5,5)

Min: between (1,4) and (4,1)

15. Maximize $C = 6x + 4y$
 Subject to: $x + 2y \leq 10$
 $3x + y \leq 15$
 $x \geq 0, y \geq 0$

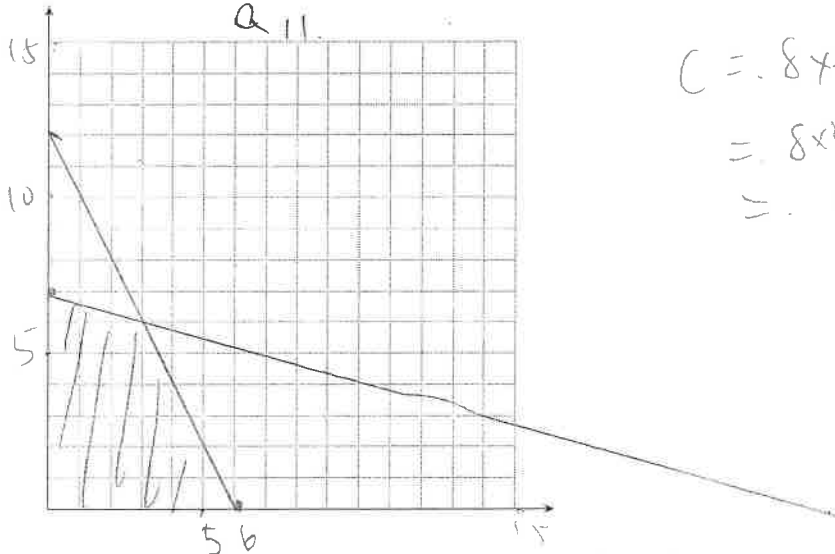
Q 10.



$$\begin{aligned}
 C &= 6x + 4y \\
 &= 6(0) + 4(5) = 20 \\
 &= 6(4) + 4(3) = 36 \\
 &= 6(5)
 \end{aligned}$$

16. Maximize $C = 8x + 10y$
 Subject to: $2x + y \leq 12$
 $x + 3y \leq 21$
 $x \geq 0, y \geq 0$

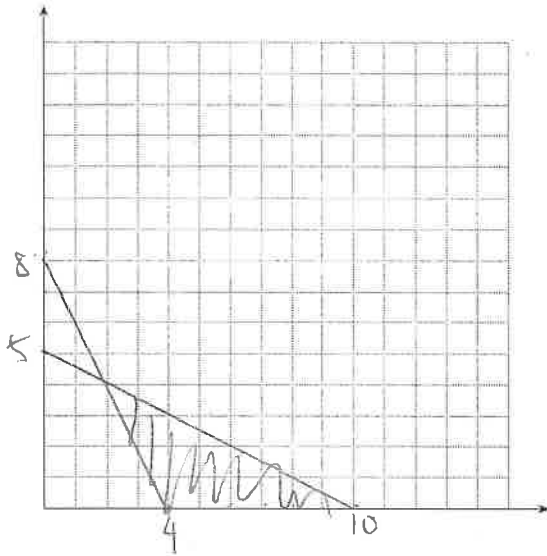
Q 11.



$$\begin{aligned}
 C &= 8x + 10y \\
 &= 8(4) + 10(6) \\
 &= 84
 \end{aligned}$$

17. Minimize $C = 6x + 8y$
 Subject to: $2x + y \geq 8$
 $x + 2y \leq 10$
 $x \geq 0, y \geq 0$

12.



$$C = 6x + 8y$$

$$= 6(2) + 8(4) = 44$$

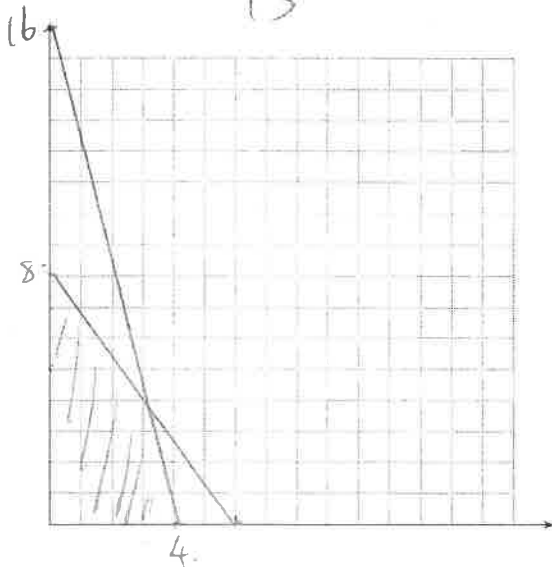
$$= 6(4) + 8(0) = 24$$

$$= 6(10) + 8(0) = 60$$

min = 24 at (4, 0)

18. Minimize $C = 6x + 3y$
 Subject to: $4x + 3y \geq 24$
 $4x + y \leq 16$
 $x \geq 0, y \geq 0$

13



min

24. at (0, 8)