Miscellaneous Exercise on Chapter 11

3. \(90^\circ\)
4. \(\frac{x}{1} = \frac{y}{0} = \frac{z}{0}\)
5. \(0^\circ\)
6. \(k = \frac{-10}{7}\)
7. \(\vec{r} = \hat{i} + 2\hat{j} + 3\hat{k} + \lambda (\hat{i} + 2\hat{j} - 5\hat{k})\)
8. \(x + y + z = a + b + c\)
9. \(9\)
10. \(\left(0, \frac{17}{2}, -\frac{13}{2}\right)\)
11. \(\left(\frac{17}{3}, 0, \frac{23}{3}\right)\)
12. \((1, -2, 7)\)
13. \(7x - 8y + 3z + 25 = 0\)
14. \(p = \frac{3}{2} \text{ or } \frac{11}{6} \text{ or } \frac{7}{3}\)
15. \(y - 3z + 6 = 0\)
16. \(x + 2y - 3z - 14 = 0\)
17. \(33x + 45y + 50z - 41 = 0\)
18. \(13\)
19. \(\vec{r} = \hat{i} + 2\hat{j} + 3\hat{k} + \lambda (-3\hat{i} + 5\hat{j} + 4\hat{k})\)
20. \(\vec{r} = \hat{i} + 2\hat{j} - 4\hat{k} + \lambda (2\hat{i} + 3\hat{j} + 6\hat{k})\)
21. \(D\)
22. \(B\)

EXERCISE 12.1

1. Maximum \(Z = 16\) at \((0, 4)\)
2. Minimum \(Z = -12\) at \((4, 0)\)
3. Maximum \(Z = \frac{235}{19}\) at \((20, \frac{45}{19}, \frac{19}{19})\)
4. Minimum \(Z = 7\) at \((\frac{3}{2}, \frac{1}{2})\)
5. Maximum \(Z = 18\) at \((4, 3)\)
6. Minimum \(Z = 6\) at all the points on the line segment joining the points \((6, 0)\) and \((0, 3)\).
7. Minimum \(Z = 300\) at \((60, 0)\);
   Maximum \(Z = 600\) at all the points on the line segment joining the points \((120, 0)\) and \((60, 30)\).
8. Minimum $Z = 100$ at all the points on the line segment joining the points $(0, 50)$ and $(20, 40)$;
   Maximum $Z = 400$ at $(0, 200)$
9. $Z$ has no maximum value
10. No feasible region, hence no maximum value of $Z$.

**EXERCISE 12.2**

1. Minimum cost = Rs 160 at all points lying on segment joining $\frac{8}{3}, 0$ and $2, \frac{1}{2}$.
2. Maximum number of cakes = 30 of kind one and 10 cakes of another kind.
3. (i) 4 tennis rackets and 12 cricket bats
   (ii) Maximum profit = Rs 200
4. 3 packages of nuts and 3 packages of bolts; Maximum profit = Rs 73.50.
5. 30 packages of screws A and 20 packages of screws B; Maximum profit = Rs 410
6. 4 Pedestal lamps and 4 wooden shades; Maximum profit = Rs 32
7. 8 Souvenir of types A and 20 of Souvenir of type B; Maximum profit = Rs 160.
8. 200 units of desktop model and 50 units of portable model; Maximum profit = Rs 1150000.
9. Minimise $Z = 4x + 6y$
   subject to $3x + 6y \geq 80, 4x + 3y \geq 100, x \geq 0$ and $y \geq 0$, where $x$ and $y$ denote the number of units of food $F_1$ and food $F_2$ respectively; Minimum cost = Rs 104
10. 100 kg of fertiliser $F_1$ and 80 kg of fertiliser $F_2$; Minimum cost = Rs 1000
11. (D)

**Miscellaneous Exercise on Chapter 12**

1. 40 packets of food P and 15 packets of food Q; Maximum amount of vitamin A = 285 units.
2. 3 bags of brand P and 6 bags of brand Q; Minimum cost of the mixture = Rs 1950
3. Least cost of the mixture is Rs 112 (2 kg of Food X and 4 kg of food Y).
5. 40 tickets of executive class and 160 tickets of economy class; Maximum profit = Rs 136000.
6. From A: 10, 50, 40 units; From B: 50, 0, 0 units to D, E and F respectively and minimum cost = Rs 510
7. From A: 500, 3000 and 3500 litres; From B: 4000, 0, 0 litres to D, E and F respectively; Minimum cost = Rs 4400
8. 40 bags of brand P and 100 bags of brand Q; Minimum amount of nitrogen = 470 kg.
9. 140 bags of brand P and 50 bags of brand Q; Maximum amount of nitrogen = 595 kg.
10. 800 dolls of type A and 400 dolls of type B; Maximum profit = Rs 16000

### EXERCISE 13.1

1. \( P(E|F) = \frac{2}{3}, P(F|E) = \frac{1}{3} \)
2. \( P(A|B) = \frac{16}{25} \)
3. (i) 0.32 (ii) 0.64 (iii) 0.98
4. \( \frac{11}{26} \)
5. (i) \( \frac{4}{11} \) (ii) \( \frac{4}{5} \) (iii) \( \frac{2}{3} \)
6. (i) \( \frac{1}{2} \) (ii) \( \frac{3}{7} \) (iii) \( \frac{6}{7} \)
7. (i) 1 (ii) 0
8. \( \frac{1}{6} \)
9. 1
10. (a) \( \frac{1}{3} \), (b) \( \frac{1}{9} \)
11. (i) \( \frac{1}{2}, \frac{1}{3} \) (ii) \( \frac{1}{2}, \frac{2}{3} \) (iii) \( \frac{3}{4}, \frac{1}{4} \)
12. (i) \( \frac{1}{2} \) (ii) \( \frac{1}{3} \) (iii) \( \frac{5}{9} \)
13. \( \frac{1}{15} \)
14. \( \frac{1}{15} \)
15. 0
16. C
17. D