

## ANSWERS

### CHAPTER 1

#### Exercise 1.1

- 1)  $Q_1 = 10.9$ ,  $Q_2 = 12$ ,  $Q_3 = 14$
- 2)  $Q_1 = 150.25$ ,  $Q_3 = 165$
- 3)  $Q_1 = 191$
- 4)  $Q_3 = 650$
- 5)  $Q_1 = 2$ ,  $Q_2 = 3$ ,  $Q_3 = 4$
- 6)  $Q_2 = 165.625$
- 7) 12, 13
- 8)  $Q_1 = 10500$ ,  $Q_2 = 11500$ ,  $Q_3 = 12500$   
 $Q_1 < Q_2 < Q_3$
- 9)  $(Q_1, Q_3) = (270, 360)$
- 10) 81

#### Exercise 1.2

- 1)  $D_6 = 69.2$ ,  $P_{85} = 80.05$
- 2)  $D_8 = 379$ ,  $P_{90} = 420$
- 3)  $D_2 = 120$ ,  $P_{65} = 280$
- 4)  $P_{15} = 11000$ ,  $P_{65} = 14000$ ,  $P_{91} = 16000$
- 5) a) 30%      b) 42%
- 6)  $D_4 = 13$ ,  $P_{48} = 14.6$
- 7)  $D_9 = 98$ ,  $P_{20} = 58.86$
- 8) 18, 20
- 9)  $(P_{20}, P_{80}) = (1625, 4400)$
- 10) 24.72%

#### Exercise 1.3

- 1)  $Q_1 = 26$ ,  $D_6 = 32.5$ ,  $P_{85} = 40$
- 2)  $Q_1 = 150$ ,  $Q_2 = 228$ ,  $Q_3 = 298$
- 3)  $Q_2 = 574$

- 4) (i)  $(D_3, D_7) = (20, 36.5)$ , (ii) 67
- 5)  $Q_2 = 19$ ,  $D_2 = 13$ ,  $P_{65} = 21.2$
- 6)  $D_1 = 22$ ,  $Q_1 = 30.5$ ,  $P_{40} = 37$
- 7)  $D_3 = 44$ ,  $D_5 = 55.5$ ,  $D_8 = 68$
- 8)  $Q_2 = 17.5$
- 9)  $(Q_1, Q_3) = (1025, 1248)$
- 10)  $D_3 = 79.5$ ,  $P_{65} = 93.5$

### MISCELLANEOUS EXERCISE - 1

- 1)  $P_{17} = 2$ ,  $Q_2 = 3$ ,  $D_7 = 4$
- 2)  $Q_2 = 5$ ,  $D_1 = 2$ ,  $P_{95} = 8$
- 3) Mathematics  $(Q_2) = 33.5$ ,  
Statistics  $(Q_2) = 30.5$ ,  
Knowledge of Mathematics is higher than Statistics.
- 4) 25
- 5)  $Q_1 = 128.125$ ,  $D_6 = 213.33$ ,  $P_{15} = 96.43$
- 6) 18, 20
- 7) 575
- 8)  $D_3 = 25$ ,  $Q_2 = 29$ ,  $P_{35} = 26$
- 9) 256
- 10)  $Q_2 = 165$ .
- 11)  $Q_2 = 41$
- 12)  $Q_2 = 55$
- 13) 14, 12
- 14)  $Q_2 = 11$
- 15)  $Q_2 = 36$
- 16)  $Q_1 = 220$ ,  $Q_3 = 340$ , (i) 62 (ii) 86
- 17)  $Q_2 = 48$
- 18)  $Q_1 = 9.725$ ,  $D_6 = 10.725$ ,  $P_{78} = 11.375$
- 19)  $Q_1 = 52.1875$ ,  $Q_2 = 57.75$ ,  $Q_3 = 63.5625$ , 51
- 20)  $Q_1 = 58.67$

## CHAPTER 2

### Exercise 2.1

- 1) 717
- 2) 11
- 3) 10
- 4) 5.5
- 5) 17
- 6) 2
- 7) 5.625
- 8) 1.965

### Exercise 2.2

- 1)  $8, 2\sqrt{2}$  ,
- 2)  $380, 2\sqrt{95}$  ,
- 3)  $6.1911, \sqrt{6.1911}$  ,
- 4)  $4.8, \sqrt{4.8}$  ,
- 5)  $1.2, \sqrt{1.2}$  ,
- 6) 2, 4
- 7)  $\sqrt{3.3514}$
- 8)  $15.5 - 25.5, 25.5 - 35.5, \dots, 95.5 - 105.5$

### Exercise 2.3

- 1)  $44, \sqrt{55.6516}$
- 2)  $\sqrt{10.5}$
- 3) 47%
- 4) 20%
- 5) 3.76
- 6)  $CV(P) = 27.27\%, CV(Q) = 33.33\%$
- i) Worker P is more consistent.

- ii) Worker Q seems to be faster in completing the job.
- 7)  $CV_1 = 1.07\%, CV_2 = 2.5\%$
- i) First department has a larger bill.
- ii) Second department has larger variability in wages.
- 8) 22.36%
- 9)  $CV(A) = 80\%, CV(B) = 75\%$   
Team B is more consistent.
- 10)  $CV(M) = 10\%, CV(S) = 12\%$   
Statistics shows more variability

### MISCELLANEOUS EXERCISE - 2

- 1) 89
- 2) 30
- 3) 60
- 4) 16.75
- 5) 12.59
- 6) 4.97
- 7) 3.25
- 8) 6.6
- 9)  $2.16, \sqrt{2.16}$
- 10) 78, 17.20, 22.05%
- 11) 59.8; 403.76
- 12)  $40.9, \sqrt{81.13}$
- 13)  $75, \sqrt{101.5}$
- 14)  $\sqrt{7.5}$
- 15)  $CV_1 = 22.22\%, CV_2 = 20.83\%$ , Brand II is more variable
- 16) 39.49%

## CHAPTER 3

### Exercise 3.1

- 1)  $-0.45$
- 2) 63, 61
- 3) 1
- 4) 29
- 5)  $-0.1881$ , Negatively skewed
- 6) 0
- 7)  $-0.5$
- 8)  $-0.143$

### MISCELLANEOUS EXERCISE - 3

- 1) 1
- 2)  $-1.5$
- 3) 0.2
- 4)  $-0.2$
- 5) 70, 30
- 6) 195.2, 198.4
- 7)  $-0.4760$
- 8)  $-0.3194$
- 9)  $-1.3182$
- 10)  $-0.6$

## CHAPTER 4

### Exercise 4.1

1. Bivariate frequency distribution :

X	200-300	300-400	400-500	Total
Y				
200-300	6	6	1	13
300-400	-	4	5	10
400-500	-	-	2	2
Total	6	10	9	25

- i) Marginal frequency distributions of income (X) :

X	200-300	300-400	400-500	Total
Frequency	6	10	9	25

Marginal frequency distributions of expenditure (Y) :

Y	200-300	300-400	400-500	Total
Frequency	13	10	2	25

- ii) Conditional frequency distributions of X when Y is between 300-400

X	200-300	300-400	400-500	Total
Frequency	-	4	6	10

- iii) Conditional frequency distributions of Y when X is between 200-300

Y	200-300	300-400	400-500	Total
Frequency	6	-	-	6

- iv) Number of families having their income  $\geq$  Rs.300 and expenses  $\leq$  Rs.400

$$= 6 + 1 + 4 + 6$$

$$= 17$$

2. Bivariate frequency distribution :

X \ Y	2	3	4	5	6	fy
1	-	1	2	-	1	4
2	-	1	-	2	-	3
3	2	1	3	-	-	6
4	-	2	-	-	1	3
5	5	-	3	1	-	9
fx	7	5	8	3	2	25

Marginal frequency distributions of income (X) :

X	2	3	4	5	6	Total
Frequency	7	5	8	3	2	25

Marginal frequency distributions of expenditure (Y) :

Y	1	2	3	4	5	Total
Frequency	4	3	6	3	9	25

3. Bivariate frequency distribution :

X \ Y	25	26	27	28	29	Total
19	(2)	(1)	-	-	-	3
20	(2)	(1)	-	(2)	-	5
21	-	(2)	(1)	-	-	3
22	-	-	(3)	(1)	-	4
23	(2)	-	(1)	-	(2)	5
Total	6	4	5	3	2	20

i) Marginal distributions of X :

X	25	26	27	28	29	Total
F	6	4	5	3	2	20

ii) Marginal distributions of Y :

Y	19	20	21	22	23	Total
F	3	5	3	4	5	20

iii) Conditional frequency distributions of age of husbands (X) when the age of wife (Y) is 23 years. :

X	25	26	27	28	29	Total
F	2	-	1	-	2	5

4. Let X denotes the marks in stats and Y denotes the marks in English Bivariate frequency distribution :

X \ Y	20-30	30-40	40-50	Total
20-30	(1)	(2)	(1)	4
30-40	(3)	(2)	(11)	7
40-50	(2)	(1)	(1)	4
Total	6	5	4	15

i) Marginal frequency distributions of (X) :

X	20-30	30-40	40-50	Total
F	6	5	4	15

Marginal frequency distributions of (Y) :

Y	20-30	30-40	40-50	Total
F	4	7	4	15

ii) Conditional frequency distributions of Y and X =47

X	20-30	30-40	40-50	Total
F	2	2	1	5

5. Bivariate frequency distribution :

Y \ X	35-39	40-44	45-49	50-54	Total
150-154	(3)	(2)	(1)	(1)	7
155-159	(1)	(3)	(2)	(1)	7
160-165	-	-	(1)	(3)	4
165-169	-	-	-	(2)	2
Total	4	5	4	7	20

i)(a) Marginal frequency distribution of Y :

Y	35-39	40-44	45-49	50-54	Total
F	4	5	4	7	20

(b) Marginal frequency distribution of X :

X	150-154	155-159	160-164	165-169	Total
F	7	7	4	2	20

ii) Conditional frequency distribution of Y, when  $155 \leq X \leq 159$

Y	35-39	40-44	45-49	50-54	Total
F	1	3	2	1	7

Ex. 4.2 :

1) 0 2) 3.37 3) 1.07 4) 2.66 5) 30.625

**MISCELLANEOUS EXERCISE - 4**

1.

Y \ X	0-4	5-9	10-14	15-19	Total
5-8	(2)	-	(3)	(1)	6
9-12	(2)	(9)	(1)	-	12
13-16	(1)	(6)	(4)	(1)	12
Total	5	15	8	2	30

i)(a) Marginal frequency distribution of X :

X	0-4	5-9	10-14	15-19	Total
F	5	15	8	2	30

(b) Marginal frequency distribution of X :

X	5-8	9-12	13-16	Total
F	6	12	12	30

ii) Conditional frequency distribution of X, when  $X < 10$

Y	5-8	9-12	13-16	Total
F	2	11	7	20

2. Let us denote the age by X and marks by Y

Y \ X	16-18	18-20	20-22	22-24	Total
10-20	(2)	-	-	-	2
20-30	-	-	-	-	-
30-40	-	-	(1)	(5)	6
40-50	(3)	(2)	(3)	(1)	9
50-60	(2)	(2)	(4)	(1)	9
60-70	-	(1)	(1)	(2)	4
Total	7	5	9	9	30

i)(a) Marginal frequency distribution of X :

X	16-18	18-20	20-22	22-24	Total
F	7	5	9	9	30

(b) Marginal frequency distribution of Y :

Y	10-20	20-30	30-40	40-50	50-60	60-70	Total
F	2	-	6	9	9	4	30

ii) Conditional frequency distribution of marks (Y), when age is in 20-22

Y	10-20	20-30	30-40	40-50	50-60	60-70	Total
F	-	-	1	3	4	1	9

3.i)

Y \ X	115-125	125-135	135-145	145-155	155-165	165-175	Total
60-62	2	1	-	-	-	-	3
62-64	1	-	3	-	-	-	4
64-66	1	1	2	1	-	-	5
66-68	-	2	-	2	-	-	4
68-70	-	1	1	-	1	1	4
Total	4	5	6	3	1	1	20

i)(a) Marginal frequency distribution of X :

X	115-125	125-135	135-145	145-155	155-165	165-175	Total
F	4	5	6	3	1	1	20

(b) Marginal frequency distribution of Y :

Y	60-62	62-64	64-66	66-68	68-70	Total
F	3	4	5	4	4	20

iii) Conditional frequency distribution of sales when expenditure is between 64-66

X	115-125	125-135	135-145	145-155	155-165	165-175	Total
F	1	1	2	1	-	-	5

iv) Conditional frequency distribution of expenditure when sales are between 125-135

Y	60-62	62-64	64-66	66-68	68-70	Total
F	1	-	1	2	1	5

4.

Y \ X	35-45	45-55	55-65	65-75	Total
115-130	(4)	-	-	-	4
130-145	(2)	(1)	(3)	-	6
145-160	(1)	(1)	(2)	(3)	7
160-175	(1)	(2)	(2)	(2)	7
Total	8	4	7	5	24

i)(a) Marginal frequency distribution of X :

X	35-45	45-55	55-65	65-75	Total
F	8	4	7	5	24

(b) Marginal frequency distribution of Y :

Y	115-130	130-145	145-160	160-175	Total
F	4	6	7	7	24

(ii) Conditional frequency distribution of Y, when  $X \leq 45$

Y	115-130	130-145	145-160	160-175	Total
F	4	2	1	1	8

5.

Y \ X	80-90	90-100	100-110	110-120	120-130	Total
500-600	-	(1)	-	(2)	(1)	4
600-700	(2)	(2)	(2)	(1)	-	7
700-800	(1)	(4)	-	-	(1)	6
800-900	(1)	(3)	(1)	-	(3)	8
900-1000	(3)	(1)	-	(1)	-	5
Total	7	11	3	4	5	30

i) Marginal frequency distribution of X :

X	80-90	90-100	100-110	110-120	120-130	Total
F	7	11	3	4	5	30

ii) Marginal frequency distribution of Y :

Y	500-600	600-700	700-800	800-900	900-1000	Total
F	4	7	6	8	5	30

6) 2.38 7) 0.67 8) 10.614 9) 4.31 10) 0.4076

## CHAPTER 5

### Exercise 5.1

- 1) Positive correlation
- 2) Positive Correlation
- 3) NO Correlation
- 4) 0.89
- 5) 18.75
- 6) i) 5 ii) -0.92
- 7) -0.1732
- 8) 13.33.

## MISCELLANEOUS EXERCISE 5

- 1) 0.5
- 2) 10
- 3) 9

- 4) 10
- 5) 0.94, High degree of positive correlation
- 6) -1. Perfect negative correlation
- 7) 1, Perfect positive correlation
- 8) No change
- 9) Same value

## CHAPTER 6

### Exercise 6.1

- 1) 50
- 2) 30, 20
- 3) 12
- 4) (i) 25, (ii) 20
- 5) (i) 100 (ii) 48
- 6) 125
- 7) 124
- 8) 31
- 9) 90
- 10) 225
- 11) 24
- 12) 276
- 13) 207
- 14) 12
- 15) 216

### Exercise 6.2

- 1) (i) 40320 (ii) 720 (iii) 39600 (iv) 2
- 2) (i) 665280 (ii) 2 (iii) 720 (iv) 12
- 3) (i) 84 (ii) 29 (iii)  $\frac{1680}{29}$  (iv) 20160
- 4) (i)  $\frac{10!}{4!}$  (ii)  $3^5 \times 5!$  (iii)  $\frac{9!}{5!}$  (iv)  $5^5 \times 5!$
- 5) (i) 28 (ii) 1
- 6) (i) 1848 (ii)  $\frac{43}{14}$  (iii) 5

- 7) (i) 6 (ii) 8  
 8) (i) 7 (ii) 8  
 9) (i) 11 (ii) 11  
 10) 5  
 13) (i) 3370 (ii)  $\frac{8}{25}$

### Exercise 6.3

- 1) 9  
 2)  $m = 6, n = 2$   
 3) 6  
 5) (i) 2401 (ii) 840  
 6) (i) 30240 (ii) 151200 (iii) 43200 (iv) 5040  
 7)  $\frac{12!.13!}{7}$   
 8) (i) 1440 (ii) 720  
 9) 144  
 10) (i) 1296 (ii) 360  
 11) 100  
 12) 720 (i) 120 (ii) 600  
 13) (i) 46,800 (ii) 20,800  
 14) 243  
 15) (i) 2880 (ii) 5040

### Exercise 6.4

- 1) (i) 120 (ii) 60480 (iii) 30240 (iv) 5040  
 2) 1260  
 3) (i) 70 (ii) 37  
 4)  $\frac{13!}{5!.4!.4!}$   
 5)  $\frac{12!}{2!.3!.2!}, \frac{8 \times 5!}{2! \times 3! \times 2!}$

- 6)  $\frac{11!}{4!.2!.2!}$  (i)  $\frac{9! \cdot {}^{10}p_2}{4! \times 2! \times 2!}$  (ii)  $\frac{8!}{2! \times 2!}$   
 7) 210  
 8) 60  
 9)  $\frac{10!}{2!.3!.2!}$   
 10) 1260, 660  
 11) 180  
 12) 144  
 13) 360, 180  
 14) 180, 60  
 15) (i) 1800 (ii) 72

### Exercise 6.5

- 1) 5040  
 2)  $20!, 18! \times 2!$   
 3) (i)  $22! \times 2!$ , (ii)  $21 \times 22!$   
 4)  $\frac{14!}{2!}$   
 5)  $18! \times 2!$   
 6) (i)  $5! \times 2!$ , (ii)  $5! \times {}^5p_2$   
 7)  $7! \times {}^8p_6$   
 8)  $4! \times {}^3p_2$   
 9)  $\frac{9!}{4!}$   
 10)  $12 \times 13!$

### Exercise 6.6

- 1) (i) 1365 (ii) 3160  
 (iii)  ${}^{16}C_5 = 4368$  (iv)  ${}^{19}C_{15} = 3876$   
 2) (i) 2 (ii) 7 (iii) 9  
 3) 4  
 4) (i)  $n = 10, r = 3$ , (ii)  $n = 10, r = 4$   
 5) 8  
 6) 126  
 7) 7000

- 8) 120
- 9) 12
- 10) 190
- 11)  ${}^nC_2 - n$ ; (a) 35 (b) 90 (c) 54
- 12) 190
- 13) (i) 45, (ii) 40
- 14) (i) 220, (ii) 216
- 15) 151200

### Exercise 6.7

- 1) 20
- 2) 4 or 3
- 3) 1 or 2
- 4)  $r + 1$
- 5) 6
- 6)  $r!$
- 7) 11 or 7
- 8)  ${}^{21}C_5$
- 9) (i) 2508, (ii) 1646, (iii) 5973
- 10) 16
- 11) 2275
- 12) 36873, 6885
- 13) 425
- 14) 51051
- 15) (a) 84, (b) 126

### MISCELLANEOUS EXERCISE - 6

- 1) 45
- 2) 120
- 3) 720, AINMRE
- 4)  $n^n, n!$
- 5) 342
- 6) 990
- 7) 360

- 8)  ${}^{26}C_6 + {}^{26}C_{10}$
- 9) 15
- 10)  ${}^{30}C_7 \times {}^{23}C_{10} \times {}^{13}C_{13}$
- 11) 127
- 12) 420
- 13) 150
- 14) 4095
- 15) 48
- 16)  ${}^8P_4 = 1680$
- 17)  $2^6 - 1 = 63$
- 18)  ${}^{20}C_8 \times {}^{12}C_7 \times {}^5C_5$
- 19) 924
- 20) 60

## CHAPTER 7

### Exercise 7.1

- 1) a)  $S = \{HH, TH, HT1, HT2, HT3, HT4, HT5, HT6, TT1, TT2, TT3, TT4, TT5, TT6\}$   $n(S) = 14$   
 b)  $S = \{HH1, HH2, HH3, HH4, HH5, HH6, TH1, TH2, TH3, TH4, TH5, TH6, HTH, HTT, TTH, TTT\}$   $n(S) = 16$
- 2)  $S = \{BB, BR, BG, RB, RR, RG, GB, GR, GG\}$   $n(S) = 9$
- 3)  $S = \{H1, H2, H3, H4, H5, H6, T1, T2, T3, T4, T5, T6\}$   
 a)  $A = \{H2, H4, H6\}$   
 b)  $B = \{H2, H3, H5, T2, T3, T5\}$   
 c)  $C = \{T1, T4\}$
- 4) a) 2300, b) 21, c) 120, d) 720
- 5) a)  $P = \{(1,2), (1,3), (1,5), (2,1), (2,2), (2,4), (2,6), (3,1), (3,3), (3,5), (3,6), (4,2), (4,4), (4,5), (5,1), (5,3), (5,4), (6,2), (6,3), (6,6)\}$



- b)  $Q = \{(1, 6), (2, 5), (3, 4), (4, 3), (5, 2), (6, 1)\}$
- c)  $R = \{(1, 1), (1, 2), (1, 4), (1, 6), (2, 1), (2, 3), (2, 5), (3, 2), (3, 4), (4, 1), (4, 3), (5, 2), (5, 6), (6, 1), (6, 5)\}$
- i) P and Q are mutually exclusive but not exhaustive.
- ii) Q and R are neither mutually exclusive nor exhaustive.
- 6) a) 52    b) 52
- 7)  $S = \{(H_1 R_{11}), (H_1 R_{12}), (H_1 R_{13}), (H_1 B_{11}), (H_1 B_{12}), (T_1 R_{21}), (T_1 R_{22}), (T_1 B_{21}), (T_1 B_{22}), (T_1 B_{23}), (T_1 B_{24})\}$
- 8) a)  $S = \{(5, 5), (5, 6), (5, 7), (5, 8), (6, 5), (6, 6), (6, 7), (6, 8), (7, 5), (7, 6), (7, 7), (7, 8), (8, 5), (8, 6), (8, 7), (8, 8)\}$
- b)  $S = \{(5, 6), (5, 7), (5, 8), (6, 5), (6, 7), (6, 8), (7, 5), (7, 6), (7, 8), (8, 5), (8, 6), (8, 7)\}$
- c)  $1 - \frac{{}^{39}C_4}{{}^{52}C_4}$     d)  $\frac{{}^{12}C_3 \times {}^1C_1}{{}^{52}C_4}$
- 4) a)  $\frac{7}{15}$     b) 5, 7, 3
- 5) a)  $\frac{4}{25}$     b)  $\frac{8}{75}$
- c)  $\frac{7}{25}$     d)  $\frac{1}{15}$
- 6) a)  $\frac{{}^8C_3 \times {}^5C_2}{{}^{13}C_5}$
- b)  $\frac{{}^8C_3 \times {}^5C_2 + {}^8C_4 \times {}^5C_1 + {}^8C_5 \times {}^5C_0}{{}^{13}C_5}$
- 7)  $\frac{5}{6}$
- 8) a)  $\frac{7! \times 3!}{9!} = \frac{1}{12}$     b)  $\frac{6! \times {}^7P_3}{9!} = \frac{5}{12}$
- c)  $\frac{7! \times 4}{9!} = \frac{1}{18}$     d)  $\frac{7!}{9!} = \frac{1}{72}$     e)  $\frac{3 \times 6 \times 7!}{9!} = \frac{1}{4}$
- 9)  $\frac{4!3!}{6!} = \frac{1}{5}$

### Exercise 7.2

- 1) a)  $\frac{1}{9}$     b)  $\frac{1}{12}$     c)  $\frac{1}{6}$
- d)  $\frac{11}{12}$     e)  $\frac{1}{6}$     f)  $\frac{1}{6}$
- 2) a)  $\frac{{}^{26}C_2}{{}^{52}C_2} = \frac{25}{102}$     b)  $\frac{{}^{13}C_2}{{}^{52}C_2} = \frac{1}{17}$     c)  $\frac{{}^4C_2}{{}^{52}C_2} = \frac{1}{221}$
- d)  $\frac{{}^{12}C_2}{{}^{52}C_2} = \frac{11}{221}$     e)  $\frac{{}^{13}C_1 {}^{39}C_1}{{}^{52}C_2} = \frac{13}{34}$     f)  $\frac{4 \times {}^{13}C_2}{{}^{52}C_2} = \frac{4}{17}$
- g)  $\frac{13[{}^4C_2]}{{}^{52}C_2} = \frac{1}{17}$
- 3) a)  $\frac{{}^4C_3 \times {}^4C_1}{{}^{52}C_4}$     b)  $\frac{{}^{13}C_1 \times {}^{13}C_1 \times {}^{13}C_1 \times {}^{13}C_1}{{}^{52}C_4}$

### Exercise 7.3

- 1)  $\frac{23}{36}$
- 2) a) 1    b)  $\frac{8}{13}$
- 3) a)  $\frac{25}{51}$     b)  $\frac{55}{221}$
- 4) a)  $\frac{8}{25}$     b)  $\frac{3}{5}$
- 5) a)  $\frac{4}{5}$     b)  $\frac{1}{2}$     c)  $\frac{1}{5}$
- 6) a)  $\frac{3}{20}$     b)  $\frac{1}{10}$     c)  $\frac{1}{4}$
- d)  $\frac{17}{20}$     e)  $\frac{1}{2}$

7)  $\frac{97}{120}$

8)  $\frac{4}{13}$

9)  $\frac{16}{35}$

#### Exercise 7.4

1)  $\frac{2}{11}$

2)  $\frac{1}{6}$

3)  $\frac{36}{61}$

4) independent

5) a)  $\frac{3}{5}$     b)  $\frac{2}{5}$     c)  $\frac{3}{20}$

6) 0.8051

7) a) 0.5    b) 0.4    c) 0.3

8) 0.96

9) a)  $\frac{1}{4}$     b)  $\frac{1}{2}$

10)  $\frac{10}{21}$

11)  $\frac{13}{35}$

12)  $\frac{47}{90}$

13)  $\frac{9}{169}$

#### MISCELLANEOUS EXERCISE - 7

1)  $S = \{(m_1, m_2), (m_1, w_1), (m_1, w_2), (m_1, w_3), (m_2, w_1), (m_2, w_2), (m_2, w_3), (w_1, w_2), (w_1, w_3), (w_2, w_3)\}$

$E = \{(m_1, w_1), (m_1, w_2), (m_1, w_3), (m_2, w_1), (m_2, w_2), (m_2, w_3)\}$

2)  $\frac{13}{32}$

3)  $\frac{5}{6}$

4)  $\frac{9}{10}$

5)  $\frac{37}{50}$

6)  $\frac{4}{13}$

7)  $A_1, A_2$ , and  $A_3$  are pair wise independent. They are not mutually independent.

8)  $\frac{52}{77}$

9) a)  $\frac{15}{91}$     b)  $\frac{59}{91}$

10)  $\frac{25}{648}$

11) 0.27

12)  $\frac{20}{81}$

13)  $\frac{7}{429}$

14) a)  $\frac{73}{105}$     b)  $\frac{32}{105}$

## CHAPTER 8

### Exercise 8.1

1) i)  $-4 \leq x \leq \frac{7}{3}$ , bounded

ii)  $0 < x \leq 0.9$ , bounded

iii)  $-\infty < x < \infty$ , unbounded

iv)  $5 \leq x < \infty$ , unbounded

v)  $-11 < x < -2$ , unbounded

vi)  $-\infty < x < 3$ , unbounded

2) i)  $x > 12$ ,  $x \in (12, \infty)$

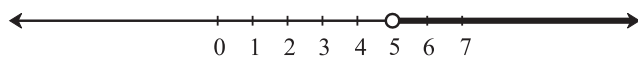
ii)  $x \leq 3$ ,  $x \in (-\infty, 3]$

iii)  $5 < x < 17$ ,  $x \in (5, 17)$

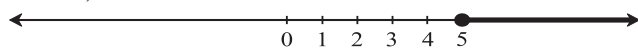
iv)  $-\frac{6}{7} < x < 2$ ,  $x \in (-\frac{6}{7}, 2)$

3) Graph

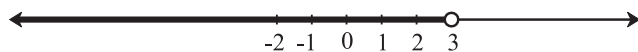
1) i)



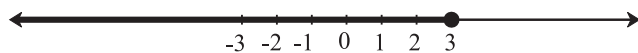
ii)



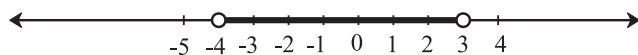
iii)



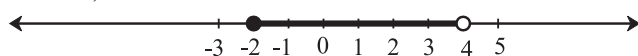
iv)



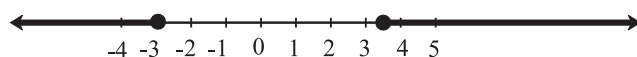
v)



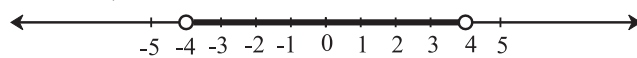
vi)



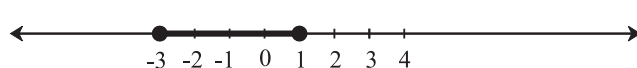
vii)



viii)



ix)



4) (i)  $x > -\frac{3}{7}$ ,  $x \in (-\frac{3}{7}, \infty)$

(ii)  $x \leq \frac{5}{3}$ ,  $x \in (-\infty, \frac{5}{3}]$

(iii)  $x < 5$ ,  $x \in (-\infty, 5)$

(iv)  $x \geq 4$ ,  $x \in [4, \infty)$

(v)  $-\frac{8}{3} < x \leq \frac{13}{3}$ ,  $x \in (-\frac{8}{3}, \frac{13}{3}]$

(vi)  $10 \leq x < 20$ ,  $x \in [10, 20)$

(vii)  $x \leq -\frac{1}{10}$  or  $x \geq \frac{17}{10}$ ,  
 $x \in (-\infty, -\frac{1}{10}) \cup [\frac{17}{10}, \infty)$

(viii)  $-16 \leq x \leq 9$ ,  $x \in [-16, 9]$

(ix)  $x < -\frac{7}{2}$  or  $x > -\frac{5}{2}$ ,

$x \in (-\infty, -\frac{7}{2}) \cup (-\frac{5}{2}, \infty)$

(x)  $-5 < x < 3$ ,  $x \in (-5, 3)$

(xi)  $x < -5$  or  $x > 2$   $x \in (-\infty, -5) \cup (2, \infty)$

5) 35

6) 82

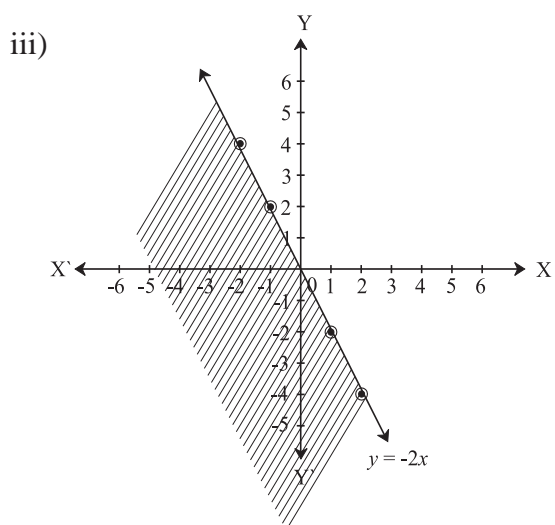
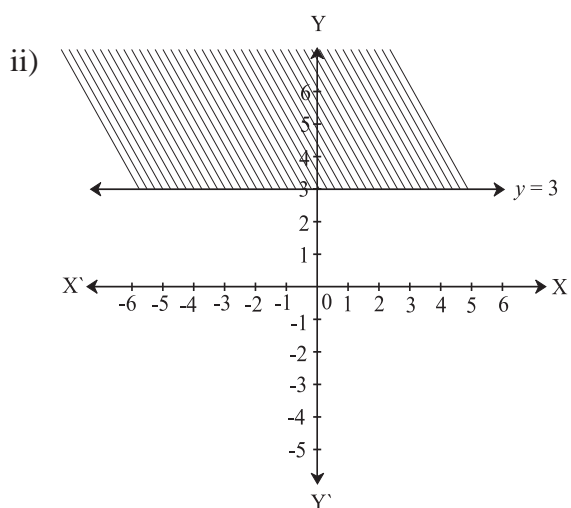
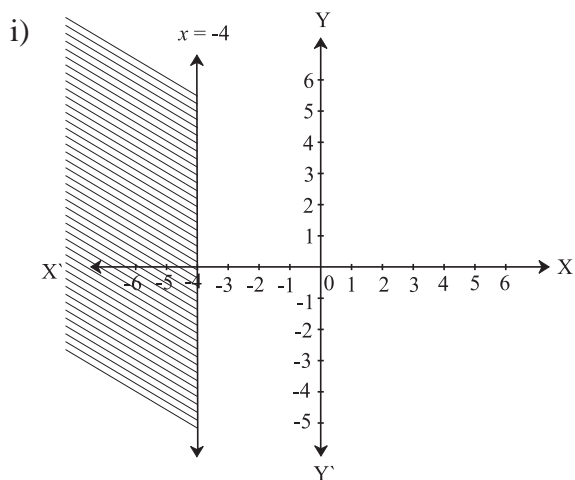
7) (5, 7) and (7, 9)

8) (6, 8), (8, 10), (10, 12)

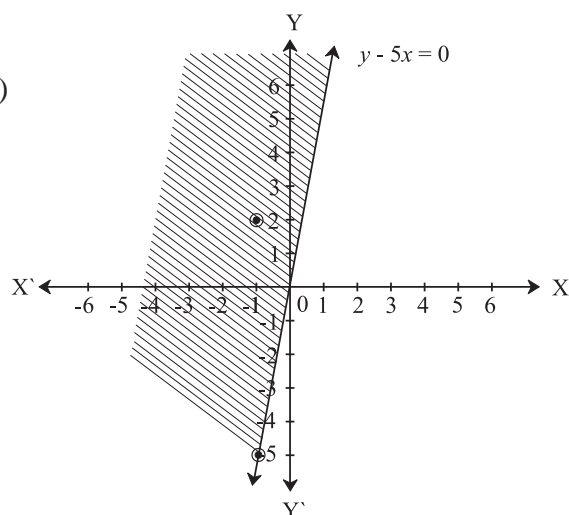
9) 41

## Exercise 8.2

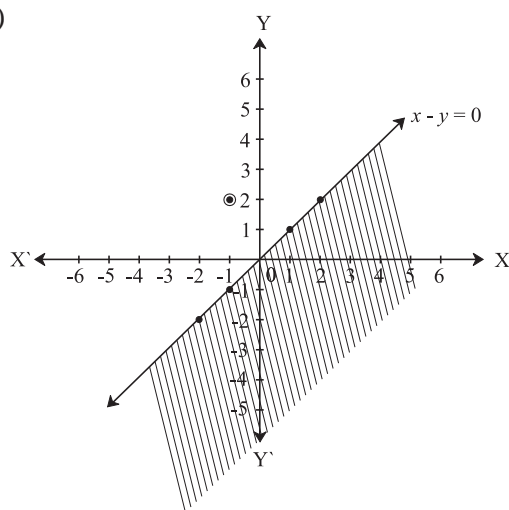
1)



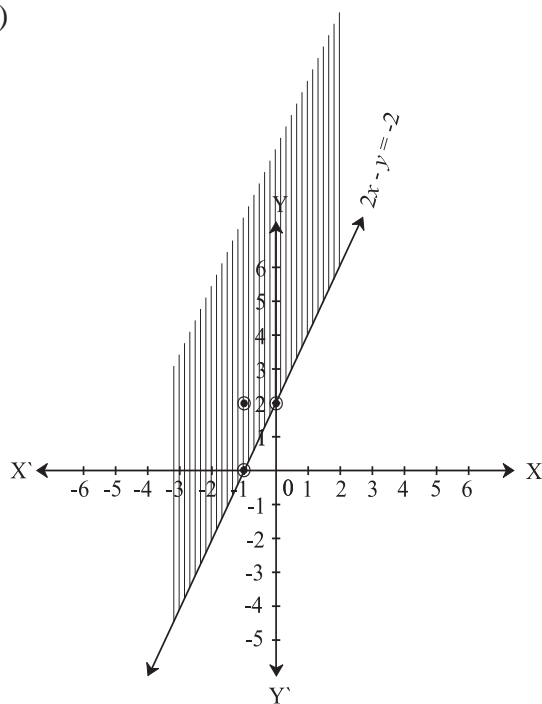
iv)



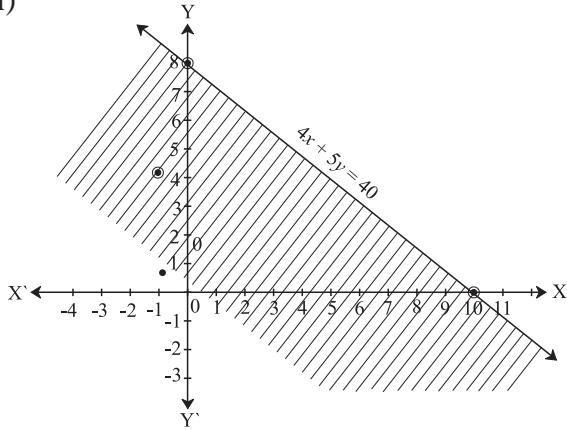
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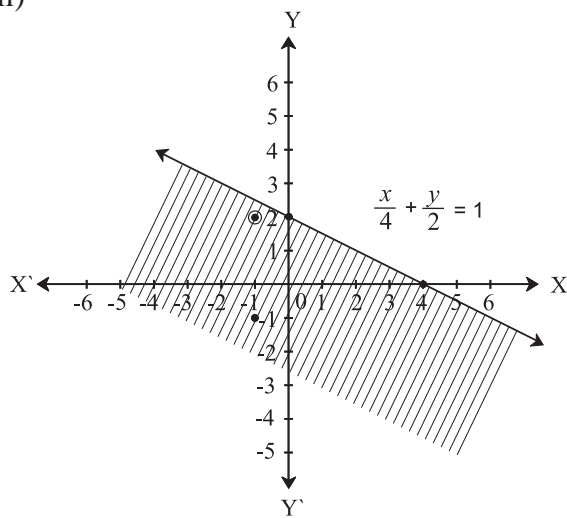
vi)



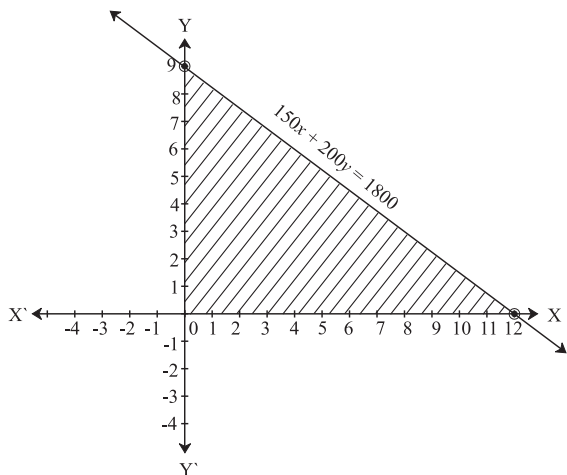
vii)



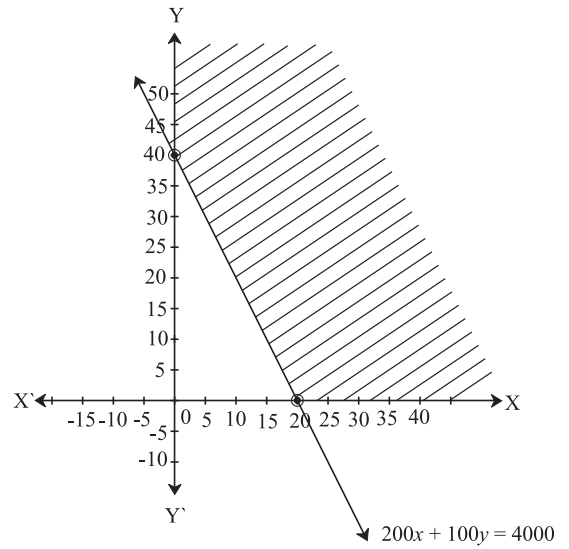
viii)



2)  $150x + 200y \leq 1800$

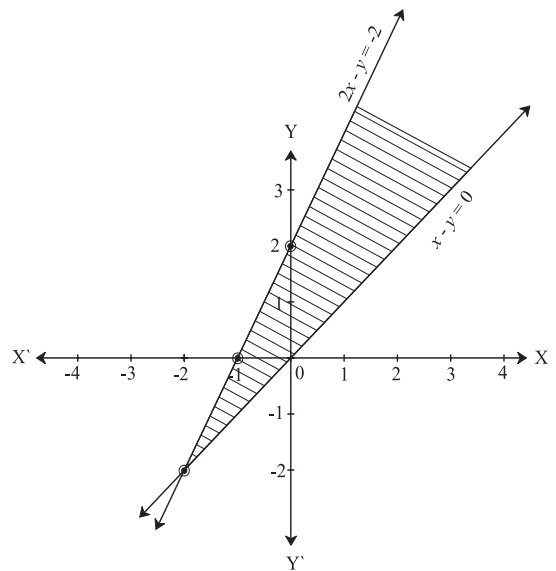


3)  $200F_1 + 100F_2 \geq 4000$

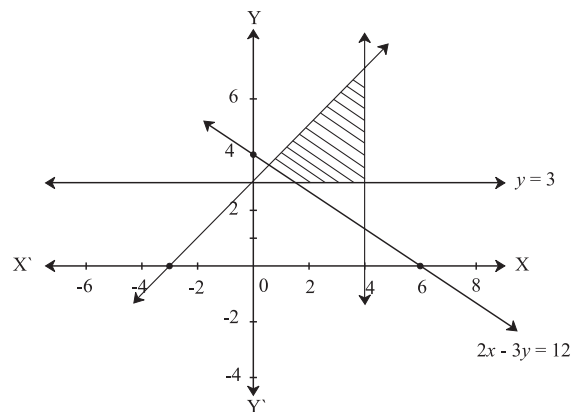


### Exercise 8.3

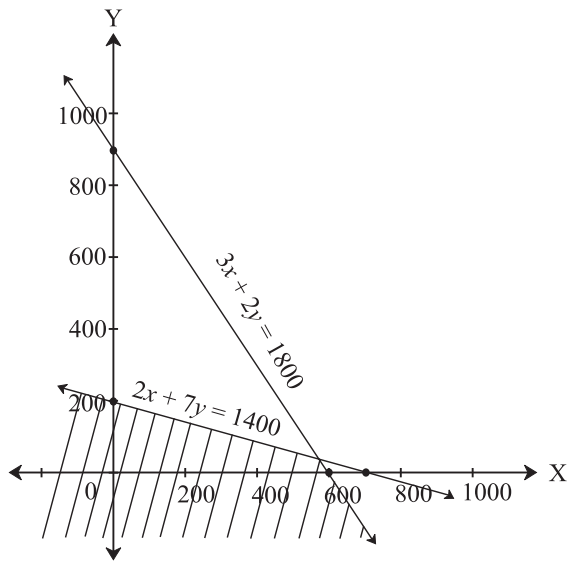
1.



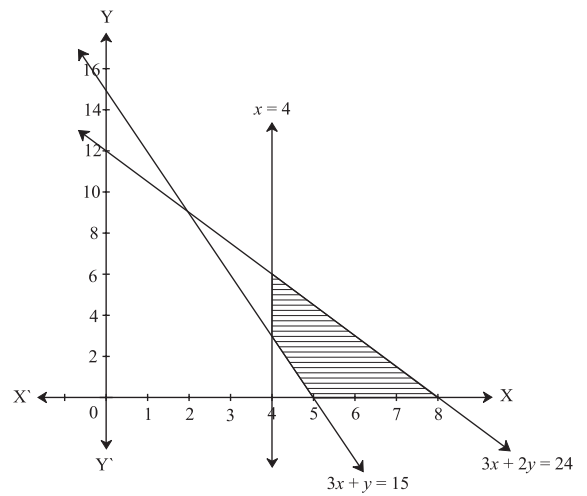
2.



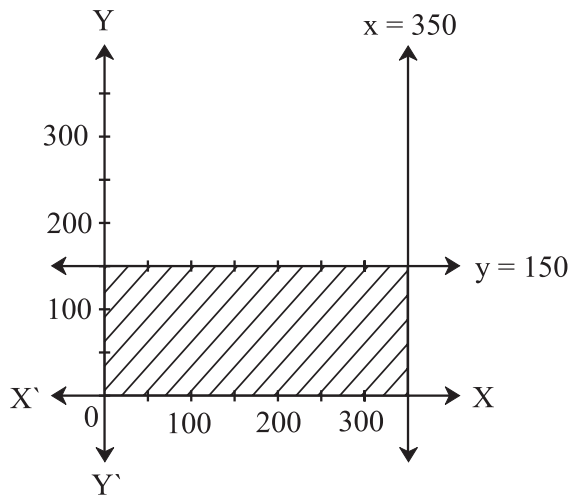
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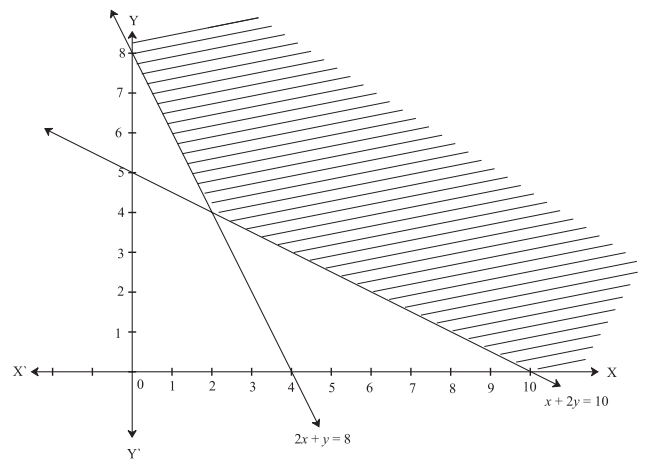
6.



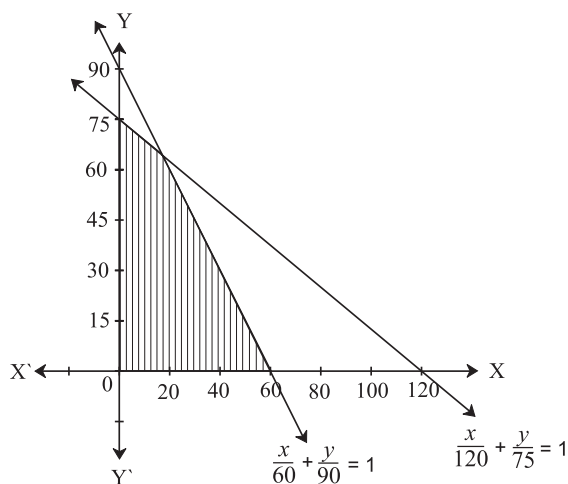
4.



7.

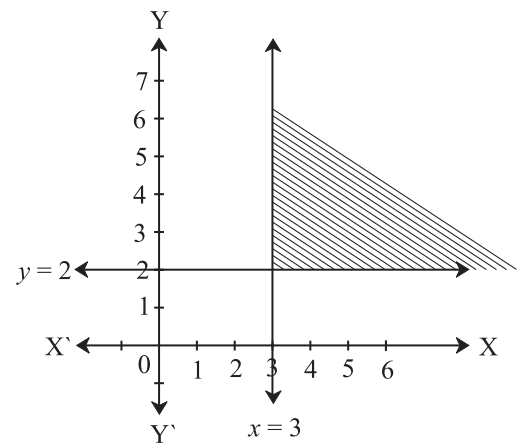


5.

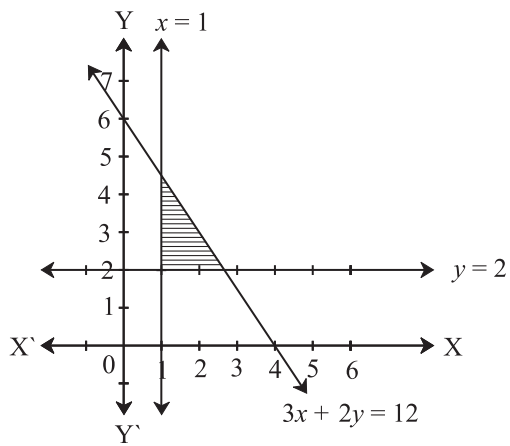


## MISCELLANEOUS EXERCISE - 8

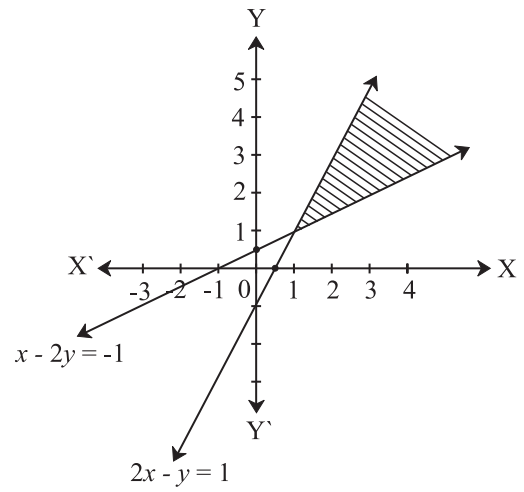
1.



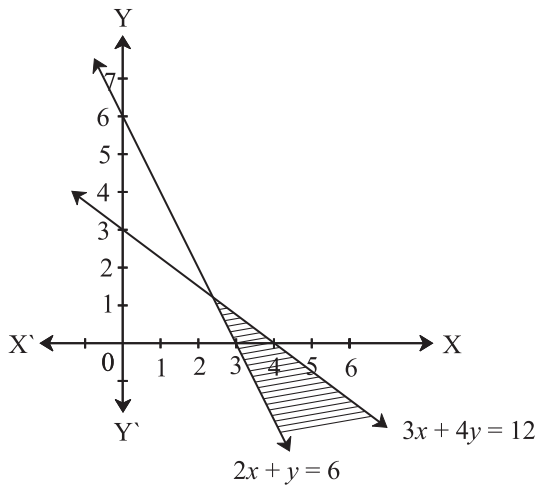
2.



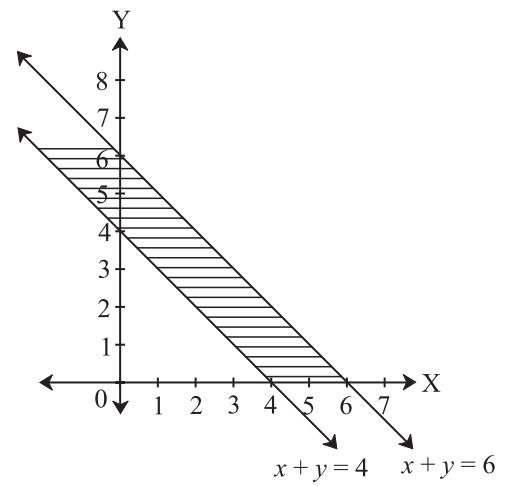
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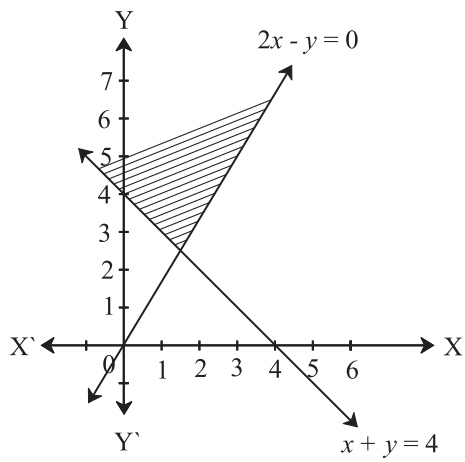
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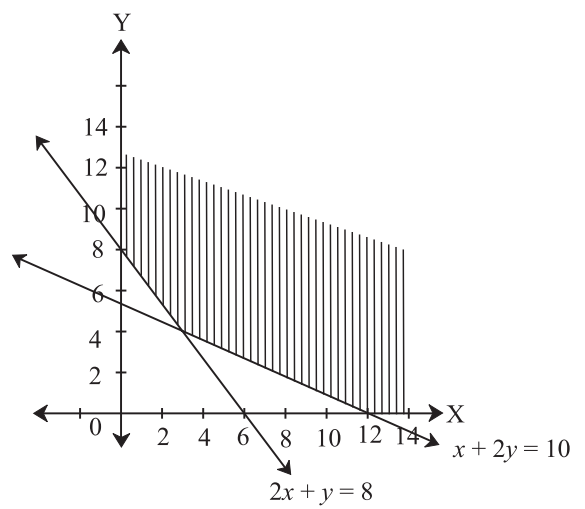
6.



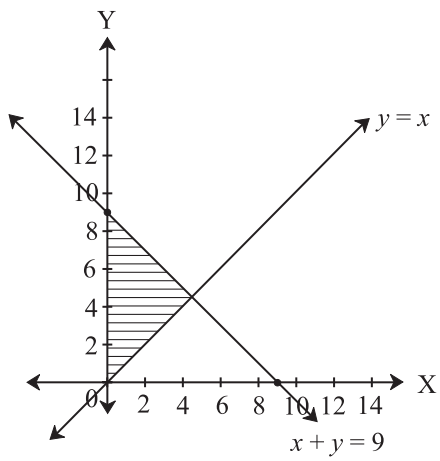
4.



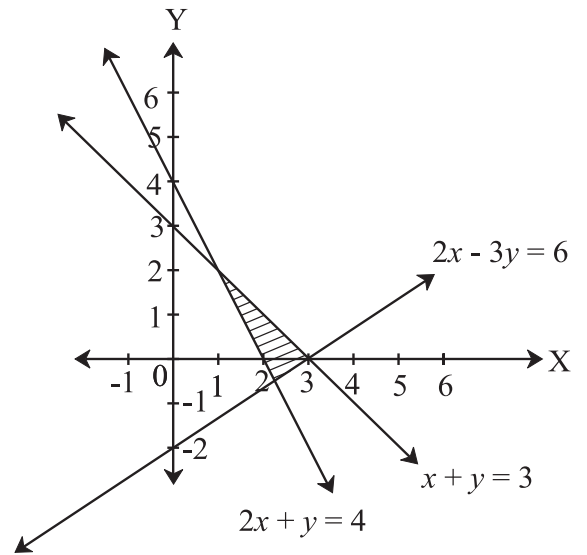
7.



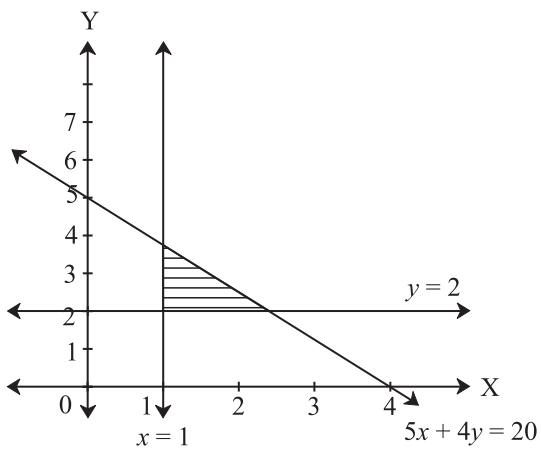
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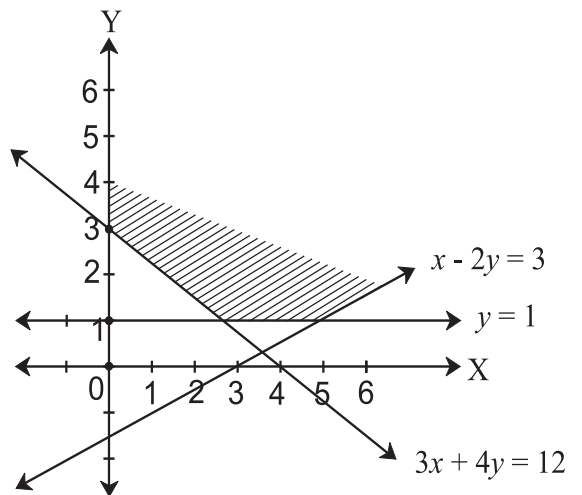
11.



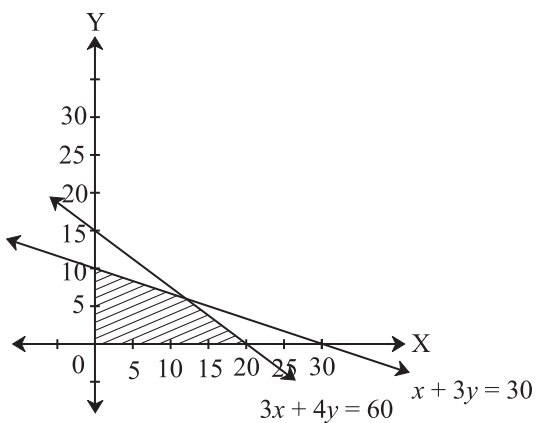
9.



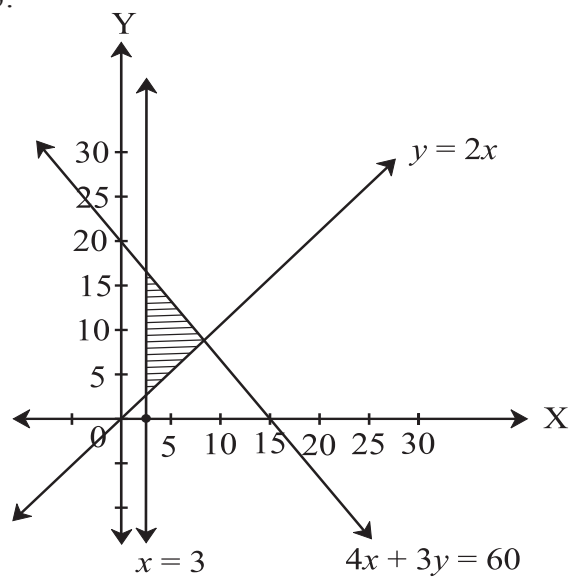
12.



10.

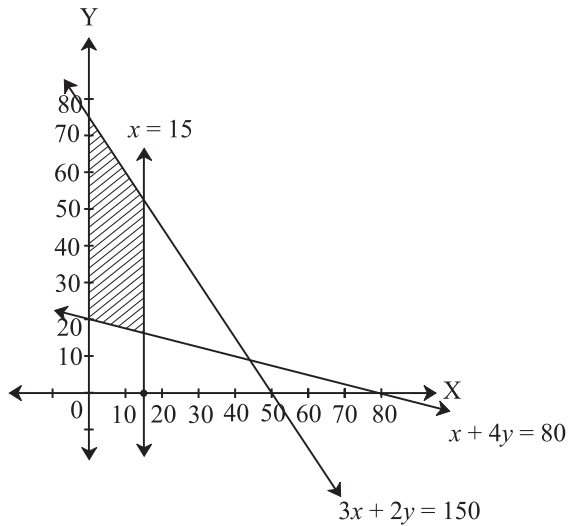


13.

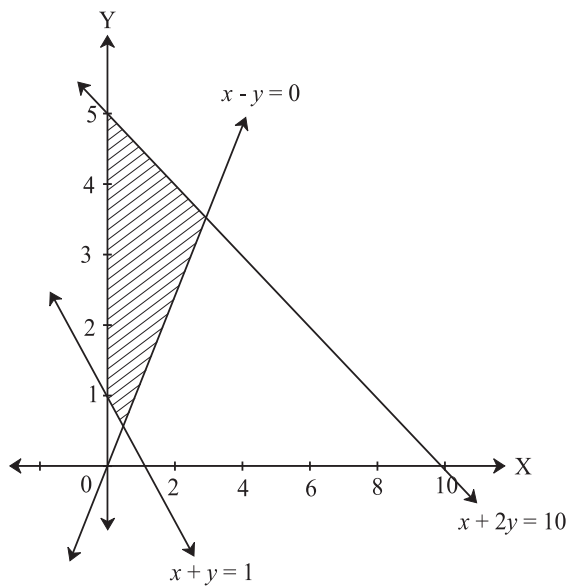




14.



15.



## CHAPTER 9

### Exercise 9.1

1. 579.2
2. 85%
3. 2%
4. 25%
5. Rs.100
6. 0.15%

7. Rs.16
8. 28.57%
9. 50%

### Exercise 9.2

1. 25%
2. Profit Rs.600
3. 5 toffees
4. Rs.3000
5. 0.8 cm.
6. 24%
7. Rs.540
8. 125%
9. 31.25%
10. Rs.1550
11. 19.6%
12. 50%
13. 20% (Rs.90)
14. Rs.200
15. Loss 2.25%

### Exercise 9.3

1. Rs.1728
2. Rs.1425
3. Rs.519.75
4. Rs.662.025
5. Rs.1698.58
6. 3 years
7. 10 years
8. Rs. 500
9. Rs.630.5
10. Rs.2050
11. Rs.5000

**Exercise 9.4**

- 1) Rs.180000 = Value after 2 years
- 2) 12.5% = Rate of Depreciation
- 3) Purchase price of machine = 300000
- 4) No. of years = 3
- 5) Value after 3 years = Rs. 343000
- 6) Rate of depreciation  $r = 10\%$
- 7) Value after 2 years = Rs.4512500
- 8) No of years  $n = 4$

**Exercise 9.5**

1. 50:72:105
2. 3:4:7
3. Rs. 50,000
4. Rs. 4,000
5. Rs. 46,000
6. 11 months
7. 3/11
8. Rs. 50,000
9. Rs. 1,080
10. Rs. 59,000

**Exercise 9.6**

1. CGST = Rs.9650, SGST = Rs.9650
2. ITC = Rs.25,000, GST = Rs.4500
3. ITC = Rs. 60,000, GST = Rs.12,000
4. Activity
5. GST payable by Heena Enterprise = Rs. 4500  
GST payable by Leena Traders = Rs. 5400 – Rs. 4500 = Rs. 900  
GST payable by Meena Beauty Products =

$$\text{Rs. } 7200 - \text{Rs. } 5400 = \text{Rs. } 1800$$

$$\text{CGST} = \text{Rs. } 3600 \quad \text{SGST} = \text{Rs. } 3600$$

6. Input Tax = Rs.1,40,000 , Output Tax = Rs. 2,24,000 , ITC = Rs. 1,40,000  
CGST = (Rs. 70,000 + Rs.42000) = Rs. 1,12,000 ,SGST= Rs. 1,12,000
7. Bill Amount = Rs.399

**Exercise 9.7**

1. (i) First firm is paying better  
(ii) Rs. 62,400
2. (i) Rs. 120  
(ii) Rs.8400
3. First
4. (i) 50  
(ii) Rs. 180
5. Rs.315; Rs. 675 less
6. Rs. 150
7. Tejas's
8. Rs 75
9. Rs. 800
10. (i) 200  
(ii) Rs. 2400
11. Rs.2200
12. (i) ₹ 2160/-  
(ii) 13.64%
13. (i) ₹ 32,000  
(ii) 9.6 %
14. Rs.21,000
15. Rs. 2250
16. Rs. 25
17. (i) Rs. 9600  
(ii) Rs. 960  
(iii) Rs. 10%

18. (i) Rs. 42000  
(ii) Rs. 4200  
(iii) 10 %

### MISCELLANEOUS EXERCISE - 9

- 1) Rs. 90000 = Annual Rent
- 2) Passing marks = 85
- 3) Loss = 25%
- 4) Gain = 50%
- 5) C. P.= Rs.400
- 6) Discount = 38.8%
- 7) Sum = 6000
- 8) Period = 2 years
- 9) Purchase Price = Rs. 10000
- 10) 2.75 meters
- 11) After 2 years
- 12) Investment in 'B' = Rs. 21000
- 13) Annual dividend = Rs.2000
- 14) B's share = Rs. 1600
- 15) Banta Invested for 11 months
- 16) Akash – Rs.9245.50  
Sameer – Rs.5186.50  
Sid – Rs.1804.00
- 17) CGST = SGST = Rs.61200
- 18) ITC = 48000  
CGST = SGST = RS.9000

