Solutions Set I

Q.1 a) Ordinary commission = 8% of Rs. 5300 .....(1m)

= Rs. 424 .....(1m)

Del credere = 3% of Rs. 5,300

= Rs. 159 .....(1m)

Total commission = Rs. 424 + Rs. 159 = Rs. 583. .....(1m)

Merchant receives Rs.(5300 - 583) = Rs. 4717. ..... (2m)

b) Let x = No. of trucks & y = No. of cars ---(1M)

be produced in order to maximize the profit.

Therefore, $x \geq 0$ and $y \geq 0$. ---(1M)

	Truck	Car	availability
Shop A	5	2	180
Shop B	3	3	135
Profit in Rs.	25000	20000	

------ (1M)

Total man-days in A = $5x + 2y$

Total man-days in B = $3x + 3y$

Total profit = $z = 25000x + 20000y$

L.P.P is

Maximize $z = 25000x + 20000y$

subject to $5x + 2y \leq 180$

$3x + 3y \leq 135$

and $x \geq 0,\ y \geq 0.$

---(3M)

Q.2 a) Commission at 3% on first Rs. 10,000 = 3% of 10,000 .....(1m)

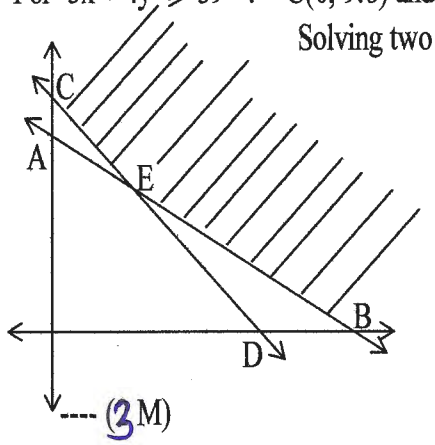
= Rs. 300 .....(1m)

Commission at $3\frac{1}{2}$ % on sales over Rs. 10,000 = 3.5% of 15,000 .....(1m)

= Rs. 525 .....(1m)

Total commission = Rs. 300 + Rs. 525 = Rs. 825. .....(2m)

b) For $2x + 3y \geq 28$: A(0, 9.3) and B (14, 0) . (0, 0) does not satisfy the inequality.
For $3x + 4y \geq 39$: C(0, 9.8) and D(13, 0). (0, 0) does not satisfy the inequality.



---- (3M)

Solving two equations, we get E= (5, 6) -----(1M)

At E(5, 6) , z = 10x + 12y = 122
C(0, 9.8), z = 117.6
B(14, 0) , z = 140
} -----(1M)

Min. value of z = 117.6 at B(0, 9.8) i.e. at x = 0 and y =9.8. -----(1M)

Q.3 a) Let the list price be Rs. 100 ---------(1M)
Reduced list price = Rs. 80 ---------(1M)
Cash discount = 5% of reduced list price = Rs.4 ---------(1M)
Net selling price = Rs. 76 ---------(1M)
The goods is sold for a net amount of Rs. 209
List price = Rs. (209 x100)/76 = Rs. 275. ---------(2M)

b) No. of units = 400
N.A.V. = Rs. 14.84
Entry load = 2.25% of Rs. 14.84
= Rs. 0.3339 ----(1 M)
P.P. of 1 unit = Rs. 14.84 + Rs. 0.3339
= Rs. 15.1739 ----(1 M)
Total investment = 400 x 15.1739
= Rs. 6069.56 ----(1 M)

S.P. of 1 unit = 24.56 - (0.5/100) x 24.56
= Rs. 24.4372 ----(1M)
S.P. of 400 units = 400 x 24.4372
= Rs. 9774.88 ----(1 M)
Gain = S.P. of 400 units - Total investment
= Rs. 9774.88 - Rs. 6069.56
= Rs. 3705.32 ----(1 M)

Q9 @ Theory Normal Distribution

(b) $n = 52C_2 = 26 \times 51$

$P(1K \& 1Q) = {}^4C_1 \times {}^4C_1 = \frac{16}{26 \times 51} = \boxed{\frac{8}{13 \times 51}}$

$P(\text{not 2 hearts}) = 1 - P(2H) = 1 - \frac{13C_2}{26 \times 51}$

$= 1 - \frac{13 \times 6}{26 \times 51} = 1 - \frac{1}{17} = \boxed{\frac{16}{17}}$

Q10 @ $E(x) = \sum px$

$= -2 \times 0.1 + (-1 \times 0.2) + (0 \times 0.2) + 1 \times 0.3 + 2 \times 0.15 + 3 \times 0.05$

$= -0.2 - 0.2 + 0 + 0.3 + 0.3 + 0.15$

$E(x) = 0.35$

$V(x) = \sum px^2 - E(x)^2$

$= \sum px^2 - (\sum px)^2$

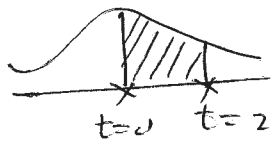
$= (4 \times 0.1 + 1 \times 0.2 + 0 + 1 \times 0.3 + 4 \times 0.15 + 9 \times 0.05) - (0.35)^2$

$= 1.95 - 0.35 \times 0.35$

$V(x) = 1.8275$

(b) (i) $M = 800, \sigma = 100$

$t = \frac{x - M}{\sigma} = \frac{1000 - 800}{100} = +2 \Rightarrow 0.4772$



% probability is 0.4772

(ii) Between 600 to 900

$t_1 = \frac{600 - 800}{100}$ $\quad t_2 = \frac{900 - 800}{100}$

$t_1 = -2$, $\quad t_2 = 1$

$\therefore$ Area $= (t_1 = -2) + (t_1 = 1)$

$= 0.4772 + 0.3413$

$= 0.8185$

Percentage prob is $= 81.85\%$