# 2nd Internal: Soln to selected Questions.

**Q.1 (e)** $364 \% 11 = 1$.

$T = 111223641133$

$111 \% 11 = 1 \longrightarrow$ Spurious
$112 \% 11 = 2$
$122 \% 11 = 1 \longrightarrow$ Spurious
$223 \% 11 = 3$
$236 \% 11 = 5$
$364 \% 11 = 1 \longrightarrow$ valid
$641 \% 11 = 3$
$413 \% 11 = 6$
$133 \% 11 = 1 \longrightarrow$ Spurious

$\therefore$ Total Spurious hits are $= 3$
Total valid hits are $= 1$

**Q.1 (f)**

$$1 - e^{-\frac{m(m-1)}{2n}} = 0.75$$

$$\therefore e^{-\frac{m(m-1)}{2n}} = 0.25$$

$$\therefore -\frac{m(m-1)}{2n} = \ln(1) - \ln(4)$$

$$= -\ln(4)$$

$$\therefore m^2 - m = 2n \ln(4)$$

$$\therefore m^2 - m - 2 \times 365 \times \ln(4) = 0$$

$$\therefore m^2 - m - 1012 = 0$$

$$\therefore m = \frac{1 \pm \sqrt{4049}}{2} \Rightarrow m = 32.31$$

$m \approx 32$ | 33

Q.2 (c)

Ex: $P_1=(2,8)$ $P_2=(7,4)$ $P_3=(-4,3)$, $P_4=(10,10)$

$d_1 = (P_1-P_3) \times (P_4-P_3)$

$= (6,5) \times (14,7)$

$= \begin{vmatrix} 6 & 14 \\ 5 & 7 \end{vmatrix} = 42-70$

$= -28 < 0$

$d_2 = (P_2-P_3) \times (P_4-P_3)$

$= (11,1) \times (14,7)$

$= \begin{vmatrix} 11 & 14 \\ 1 & 7 \end{vmatrix} = 77-14$

$= 63 > 0$

$d_3 = (P_3-P_1) \times (P_2-P_1)$

$= (-6,-5) \times (5,-4)$

$= \begin{vmatrix} -6 & 5 \\ -5 & -4 \end{vmatrix} = 24-(-25)$

$= 49 > 0$

$d_4 = (P_4-P_1) \times (P_2-P_1)$

$= (8,2) \times (5,-4)$

$= \begin{vmatrix} 8 & 5 \\ 2 & -4 \end{vmatrix} = -32-10$

$= -42 < 0$

$d_1 d_2 < 0$ and $d_3 d_4 < 0$

$\Rightarrow \overline{P_1P_2}$ and $\overline{P_3P_4}$ intersects.

Q.2 (b) (i)

| S | B | A | T | C | G |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 1 | 0 | 1 |
| 4 | 0 | 1 | 0 | 0 | 1 |
| 5 | 0 | 1 | 0 | 1 | 1 |
| 6 | 0 | 1 | 1 | 0 | 1 |
| 7 | 0 | 1 | 1 | 1 | 1 |
| 8 | 1 | 0 | 0 | 0 | 1 |
| 9 | 1 | 0 | 0 | 1 | 1 |
| 10 | 1 | 0 | 1 | 0 | 1 |
| 11 | 1 | 0 | 1 | 1 | 1 |
| 12 | 1 | 1 | 0 | 0 | 1 |
| 13 | 1 | 1 | 0 | 1 | 1 |
| 14 | 1 | 1 | 1 | 0 | 1 |
| 15 | 1 | 1 | 1 | 1 | 1 |