1) Given

$\lambda = 12$ for time $= 30$ days

So $\lambda = 12/30 = 0.4$ per day.

a) exactly 3 accidents in first 10 days

$\Rightarrow$

$$P(X=i) = e^{-\lambda}\frac{\lambda^i}{i!}$$

~~p(x=3)=~~

$\lambda = 0.4 \times 10$ For 10 days.

$$P(X=3) = e^{-4}\frac{4^3}{3!}$$

$$= 0.018 \times \frac{64}{3\times2}$$

$$= 0.195$$

b) Given exactly 3 accidents in first 10 days

$\lambda = 0.3$ per day.

Last 6 days probability

$$= 1 - P(X \leq 4)$$

So

$$1 - \sum_{i=1}^{4} e^{-\lambda}\frac{\lambda^i}{i!}$$

$$\Rightarrow 1 - e^{-\lambda}\left[\sum_{i=1}^{4} \frac{\lambda^{i}}{i!}\right]$$

$$\Rightarrow 1 - e^{-0.3}\left[\frac{0.3}{1!} + \frac{0.3^{2}}{2!} + \frac{0.3^{3}}{3!} + \frac{0.3^{4}}{4!}\right]$$

$$\Rightarrow 1 - e^{-0.3}\left[0.3 + 0.045 + 0.0045 + 0.00034\right]$$

$$\Rightarrow 1 - e^{-0.3} \times 0.3498$$

$$\Rightarrow 1 - 0.74 \times 0.3498 = 0.7411$$

Ans.

2) Given

$D: \quad N(40, 36)$

$T: \quad N(45, 9)$

a)

For D:

$$p(x > 45) \Rightarrow p\left(\frac{x-\mu}{\sigma} > \frac{45-\mu}{\sigma}\right)$$

$$\Rightarrow p\left(z > \frac{45-40}{6}\right)$$

$$\Rightarrow p\left(z > \frac{5}{6}\right)$$

$$\Rightarrow 1 - p(z < 0.833)$$

$$\Rightarrow 1 - \frac{0.06 + 0.07}{2}$$

$$= 1 - 0.065 = 0.935$$

For T:

$$p(x > 45) \Rightarrow p\left(z > \frac{45-45}{3}\right)$$

$$\Rightarrow p(z > 0) = 1$$

we will prefer ~~a~~ Company T which has higher confidence to claim.

Q,

~~$\lambda = 12$~~

2, b,

D :

$$P(X > 42) = P\left(Z > \frac{42-40}{6}\right)$$

$$\Rightarrow P\left(Z > \frac{1}{3}\right)$$

$$\Rightarrow 1 - P(Z < 0.333)$$

$$\Rightarrow 1 - 0.03 = 0.97$$

For T :

$$P(X > 42) \Rightarrow P\left(Z > \frac{42-45}{3}\right)$$

$$\Rightarrow 1 - P\left(Z < \frac{-3}{3}\right)$$

$$= 1 - P(Z < -1)$$

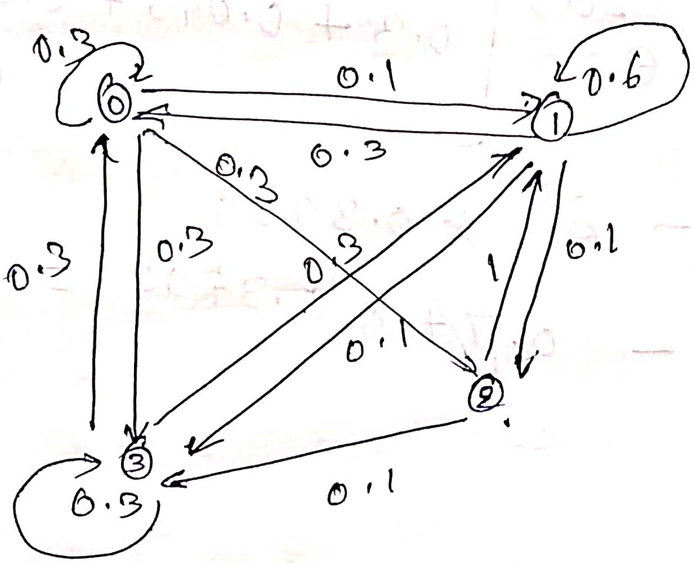
$$\Rightarrow 1 - 0.15866$$

$$= 0.84134$$

we will prefer company D, which has higer confidence ~~to~~ to claim.

4// $S = \{0, 1, 2, 3\}$

$$P = \begin{bmatrix} 0.3 & 0.1 & 0.3 & 0.3 \\ 0.2 & 0.6 & 0.1 & 0.1 \\ 1 & 0 & 0 & 0 \\ 0.3 & 0.3 & 0.1 & 0.3 \end{bmatrix}$$



a) Markov chain is irreducible when all its states are reachable from all other states

lets take 0 state.

$(0,1) \rightarrow 0 \rightarrow 1$

$(0,2) \rightarrow 0 \rightarrow 2$

$(0,3) \rightarrow 0 \rightarrow 3$

0 is reachable from all other state

Now state 1

(1, 0) → 1 → 0
(1, 2) → 1 → 2
(1, 3) → 1 → 3

1 is reachable from all other states

Now state 2

(2, 1) → 2 − 1

2 is not able to reach any except state 1.

Now state 3

(3, 1) → 3 → 1
(3, 2) → 3 → 2
(3, 0) → 3 → 0

3 is reachable to all other states.

Since state 2 is not reachable to other states. This markov chain is not irreducible.

b) State i is said to be transient when state i is uncertain ~~to state i~~ & recurrent supposed to be certain

So here

when state is 0

0 → 0
0 → 1 → 0
0 → 1 → 3 − 0
0 → 3 → 1 → 0
0 → 2

0 is transient state

when State is 1

$1 \rightarrow 1$

$1 \rightarrow 0 \rightarrow 1$

$1 \rightarrow 2 \rightarrow 1$

$1 \rightarrow 3 \rightarrow 1$

$1 \rightarrow 3 \rightarrow 0 \rightarrow 1$

State 1 is able to retain 1 so it is recurrent state.

when State is 2

$2 \rightarrow 1 \rightarrow 2$

State 2 is able to retain to 2 It is recurrent state.

when State is 3

$3 \rightarrow 3$

$3 \rightarrow 0 \rightarrow 3$

$3 \rightarrow 1 \rightarrow 3$

$3 \rightarrow 2$

$3 \rightarrow 0 \rightarrow 1 \rightarrow 3$

$3 \rightarrow 1 \rightarrow 0 \rightarrow 3$

State 3 is ~~able to~~ traincent state

d) $p(X_4 = 0 \mid X_3 = 2)$

Failure

Failure Success

$$
\begin{array}{l}
\\
\\
\\
\\
\text{Success}
\end{array}
\begin{bmatrix}
0.3 & 0.1 & 0.3 & 0.3 \\
0.2 & 0.6 & 0.1 & 0.1 \\
0.1 & 0 & 0 & 0 \\
0.3 & 0.3 & 0.1 & 0.3
\end{bmatrix}
$$

$p(x_4 = 0 \mid X_3 = 2) = 1$

the above one is 2 step

so p^2

$p(X_4 = 0 \mid X_3 = 2) = (1)^2$

$p(x_4 \neq 0 / x_3 = 2) = 1$

3)

$\mu = 110$, $\sigma = 1.2$

(A)

a) $\bar{x} = 108$ $n = 340$

$\alpha = 0.10$

$H_0 : \mu = 110$

$H_a : \mu < 110$

at $\alpha = 0.10$

$$\text{test Statistic} = \frac{108 - 110}{1.2}$$

$$= \frac{-2}{1.2} = -0.16$$

Ans

From the z-table probability is ~~0.43~~ $= 0.4364$.

~~$Z_{0.10} \Rightarrow 0.5398$~~

~~$Z_{0.16} \neq 0.4364$~~

$Z_{0.10} = 0.5398$

$Z_{0.16} = 0.4364$