KOWSIK N D
CSE S4
Roll No 31

1. The life time T in hours of a particular make of fan is assumed to follow exp dist with mean = 0.0003 Find proportion of fan which give atleast 10,000 hours. If the fan is redesigned so that its life time may be modelled by an exp dist with $\lambda = 0.00035$ would you expect more fans or fewer to give atleast 10 000 hour service.

Ans. Let x be the time in hour for defining life time

$\lambda = 0.0003$

$x \sim Exp(0.0003)$

$$P(x \geq 10000) = \int_{10000}^{\infty} \frac{1}{0.0003} e^{-\frac{x}{0.0003}} dx$$

$$= e^{-10000/0.0003}$$

$\lambda = 0.0003$ is WRONG

mean.

$\frac{1}{\beta} = 0.0003$

$\therefore x \sim (\frac{1}{0.0003})$

$$f(x) = \begin{cases} 0.0003 e^{-0.0003x}, & 0<x<\infty \\ 0 & \text{otherwise} \end{cases}$$

$$P(x \geq 10000) = \int_{10000}^{\infty} 0.0003 e^{-0.0003x}$$

$$= e^{-3}$$

$$= 0.0498$$

Now $\lambda = 0.00035$

$$P(x \geq 10,000) = \int_{10000}^{\infty} 0.00035 e^{-0.00035x}$$

$$= 0.03019$$

Actually the proportion reduced so fewer fans will be be giving atleast 10,000 hours

2. Mean height of 500 male students in certain college is 151 cm and standard deviation is 15 Assume heights are normally distributed. Find how many std heights are between 120 cm & 155 cm.

Let x be RV defining the height of students

mean $\mu = 151$

Standard deviation = 15

$x \sim N(151, 15^2)$ $\quad z = \frac{x-\mu}{\sigma}$

$P(120 < x < 155)$

$$= P\left(\frac{120-151}{15} < z < \frac{155-151}{15}\right)$$

$$= P(-2.07 < z < 0.27)$$

$$= P(0<z<2.07) + P(0<z<0.27)$$

$$= 0.4808 + 0.1064$$

$$= 0.5872$$

3. The time taken by students to get ready in morning before school, varies evenly between 20 & 75 min what is probab that random selected std will take more than 1h to get ready for school.

Let x be the time in minutes before school

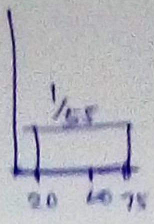
$x \sim U(20, 75)$

$a = 20 \quad b = 75$

$$f(x) = \begin{cases} \frac{1}{75-20}, & 20<x<75 \\ 0, & \text{otherwise} \end{cases}$$

$$\begin{cases} \frac{1}{55}, & 20<x<75 \\ 0, & \text{otherwise} \end{cases}$$

$\therefore P(X > 1h) = P(X > 60)$



$= P(60 < X < 75) + P(X \geq 75)$

$= \int_{60}^{75} \frac{1}{55}\, dx + 0$

$= \frac{1}{55}[x]_{60}^{75} = \frac{15}{55} = \frac{3}{11} = \underline{\underline{0.2727}}$