1. In a certain city, the daily consumption of electric power in millions of kilowatt hours can be treated as a random variable having an **Erlang distribution** with parameters $\lambda = 1/2$ and $\alpha = 3$. If the power plant of this city has a daily capacity of 12 million kilowatt hours, what is the probability that this power supply will be inadequate on any given day?

(1)	Civen: 1- 42 and 223.
	let 'X be the dasky comment him of lectric former in millions of kilowatt hours busing an Erlang durkibution.
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(12) 22 e-x/2 $n^2 e^{-x/2}$ power supply is inadequate) find da (X712) = 250° = 0.0625Dr. Jayagopal_Module 5

- 2. The time (in hours) required to repair a machine is **exponentially distributed** with a mean 2.
- (a) What is the probability that the repair time exceeds 2 hrs?
- (b) What is the conditional probability that a repair takes at least 10 hrs given that its duration exceeds 9 hrs?

(Mean = X)

(b)
$$P(x \ge 10 | x \ge 9)$$

$$= P(x \ge 1) \cdot (\text{Memoryless})$$

$$= P(x \ge 1) \cdot (\text{Memoryless})$$

$$= \int_{0}^{1} f(x) dx$$

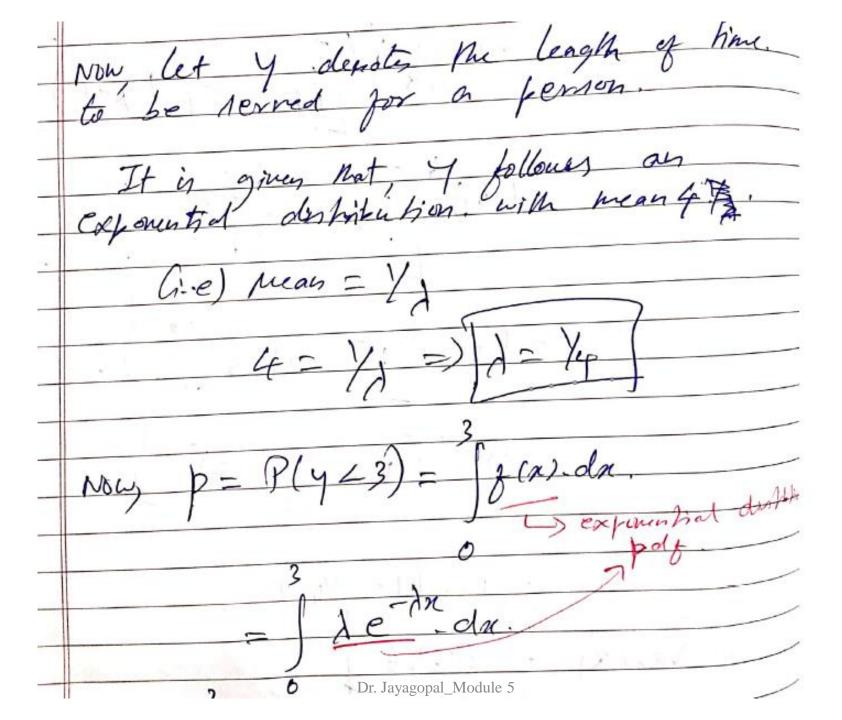
$$= \int_{0}^{1} e^{-x/2} dx$$

$$= e^{-0.5}$$

$$= e^{-0.5}$$

$$= (-0.5)$$

3. The length of time for one individual to be served at a cafeteria is a random variable having an **exponential distribution** with a mean of 4 minutes. **What is the probability** that a person is served in less than 3 minutes on at least 4 of the next 6 days?



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Problem 4: Let X be a R.V with exponential distribution
with parameter of.

With Find 'k' such that $\frac{P(X>k)}{P(X\leq k)} = t$.

(i) Find var(x) If P(X=1) = P(X>1).

Sol!

Given: P(x>k) = t - 0 F(x) = he P(x>k) P(x>k) = t - 0 P(x>k) P($\int d \cdot e^{-\lambda x} dx = t \int d \cdot e^{-\lambda x} dx$ *[= +: *[= - 1x].

$$e^{-\alpha b} = \frac{e^{-\lambda k}}{e^{-\lambda k}} = \frac{e^{-\lambda k}}{e^{-\lambda$$

(i) Chiven
$$P(x \neq 1) = P(x > 1)$$

$$1 = \frac{P(x > 1)}{P(x \neq 1)} \qquad (2) \text{ and } \frac{P(x > k)}{P(x \neq k)} = 6 \qquad (3)$$

Ay lomparing (1) and (2), we have
$$t \ge 1$$
 and $k \ge 1$.

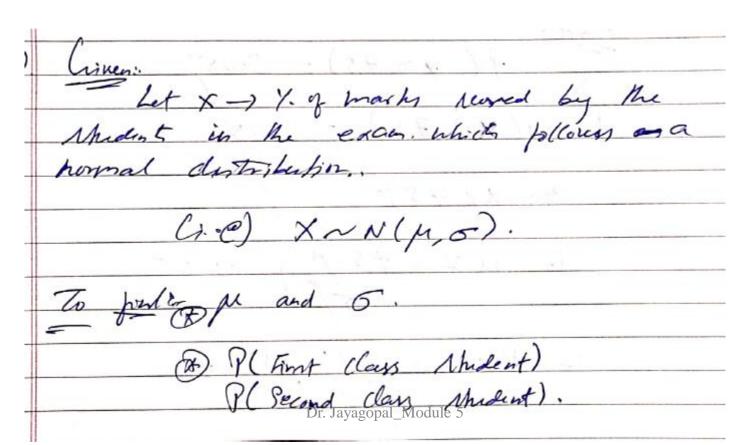
From (i), we have, $k = \frac{1}{4} \log \left(\frac{t+1}{t} \right)$.

Now, $d = \frac{1}{4} \log \left(\frac{t+1}{t} \right)$ (i.t. $\frac{1}{4} = \log (2)$.

Yar (x) $= \frac{1}{4^2} = \frac{1}{(\log(2))^2}$

Problem 5:

In an engineering examination, a student is considered to have failed, secured second class, first class and distinction, according as he scores less than 45%, between 45% and 60%, between 60% and 75% and above 75% respectively. In a particular year 10% of the students failed in the examination and 5% of the students got distinction. Find the percentages of students who have got first class and second class. (Assume normal distribution of marks)



Now, we have
$$\frac{P(x + 45) = 0.10}{P(x + 75)} = 0.05$$
Find:-
$$P(x + 45) = 0.10.$$

$$P(24 + 45-P()) = 0.10.$$

$$\frac{45 - \mu}{\sigma} = -1.26$$

$$\mu - 1.26\sigma = 45$$

$$\frac{\int e^{-2\pi t} e^{-2\pi t}}{\int (x > 75)} = 0.05$$

$$1 - \int (x > 75) = 0.05$$

$$1 - 0.05 = \int (x > 275)$$

$$\int (x > 75) = 0.05$$

$$\int (x > 75) = 0.05$$

$$\int (x > 75) = 0.05$$

$$\frac{75 - \mu}{\sigma} = 1.64$$

$$\mu + 1.64\sigma = 75 \quad \boxed{2}$$

From Equation 1 and 2, We have

$$\mu = 58.15$$

$$\sigma = 10.28$$

(a)
$$P(First \ Class \ Middent)$$

$$= P(b0 \pm X \pm 75)$$

$$= P(X \pm 75) - P(X \pm 60).$$

$$= P(X \pm 1.64) - P(Z \pm 0.15)$$

- = 0.9495 0.5714
- = 0.3781

