**KFUPM**-EE DEPT.

EE570- Stochastic Processes

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Assignment # 2 Due:

**Review: Random Variables and Expectations**

Version 3 revised

1. We measure for resistance ***R*** of each resistor in a production line and we accept only the units the resistance of which is between 97 and 103 ohms. Find the percentage of the accepted units
	1. If ***R*** is uniform between 94 and 105.
	2. If ***R*** is normal with mean=100, and variance of 2 ohms.
2. If **X** is *N*(1,2) find  and .
3. The number of cars arriving at a KFUPM main gate at any 2-minute period is a Poisson random variable with density function



If the average arrival rate is 10 cars per minute, find

1. The probability that more than 6 cars will arrive during any 2-minute period.
2. The probability that no cars will arrive.
3. Find $F\_{Y}(y)$ and $f\_{Y}(y)$ if $Y=-2X+3$ and $f\_{X}\left(x\right)=2e^{-2x}u(x)$, where $u(x)$ is the unit step function. Support your answer with Matlab simulation. i.e generate exponential samples and process them to produce *Y*. Then, on the same plot show two traces for the simulated-pdf and the theoretical one.
4. Suppose that the function

$$f\_{X}\left(x\right)=\frac{\frac{16}{π}}{\left(4+x^{2}\right)^{2}}$$

is found to be a good empirical fit to the probability density function of some random experimental data represented by a random variable $X$. Find the mean, second moment, and variance of $X$.

1. For the exponential distribution derive the characteristic function and use it to find the mean and variance.

*“When you can* ***measure*** *what you are speaking about,*

*and express it in numbers, you know something about it.”*

 **Lord Kelvin**

Good luck , **Dr. Ali H. Muqaibel**