6. Plotting and fitting of Exponential distribution and graphical representation of probabilities.

The support (set of values the Random Variable can take) of an Exponential Random Variable is the set of all positive real numbers. Suppose we are posed with the question- How much time do we need to wait before a given event occurs? The answer to this question can be given in probabilistic terms if we model the given problem using the Exponential Distribution. Since the **time** we need to wait is unknown, we can think of it as a Random Variable. If the probability of the event happening in a given interval is proportional to the length of the interval, then the Random Variable has an exponential distribution. The support (set of values the Random Variable can take) of an Exponential Random Variable is the set of all positive real numbers.

This distribution can be used to solve following type of real life problems-

- How long does a shop owner need to wait until a customer enter a shop.

- How long will a battery continue to work before it dies.

- How long will a computer continue to work before it breakdown.

$$f(x) = \begin{cases} \lambda e^{-\lambda * x}, & x \geq 0 \\ 0, & x < 0 \end{cases}$$

$$E(X) = \frac{1}{\lambda}, \qquad Var(X) = \frac{1}{\lambda^2}$$

Here λ is the rate parameter and its effects on the density function .

e is a constant roughly equal to 2.718

How to Implement in excel

EXPON.DIST(X,lambda,cumulative)

EXPON.DIST(X,lambda,FALSE)

				case 1	case 2	case 3	
μ	400		x	500	550	600	
λ	0.0025						
		Exponential Distribution		0.000716	0.000632	0.000558	

	500	0.000716
	550	0.000632
	600	0.000558

Exponential Distribution