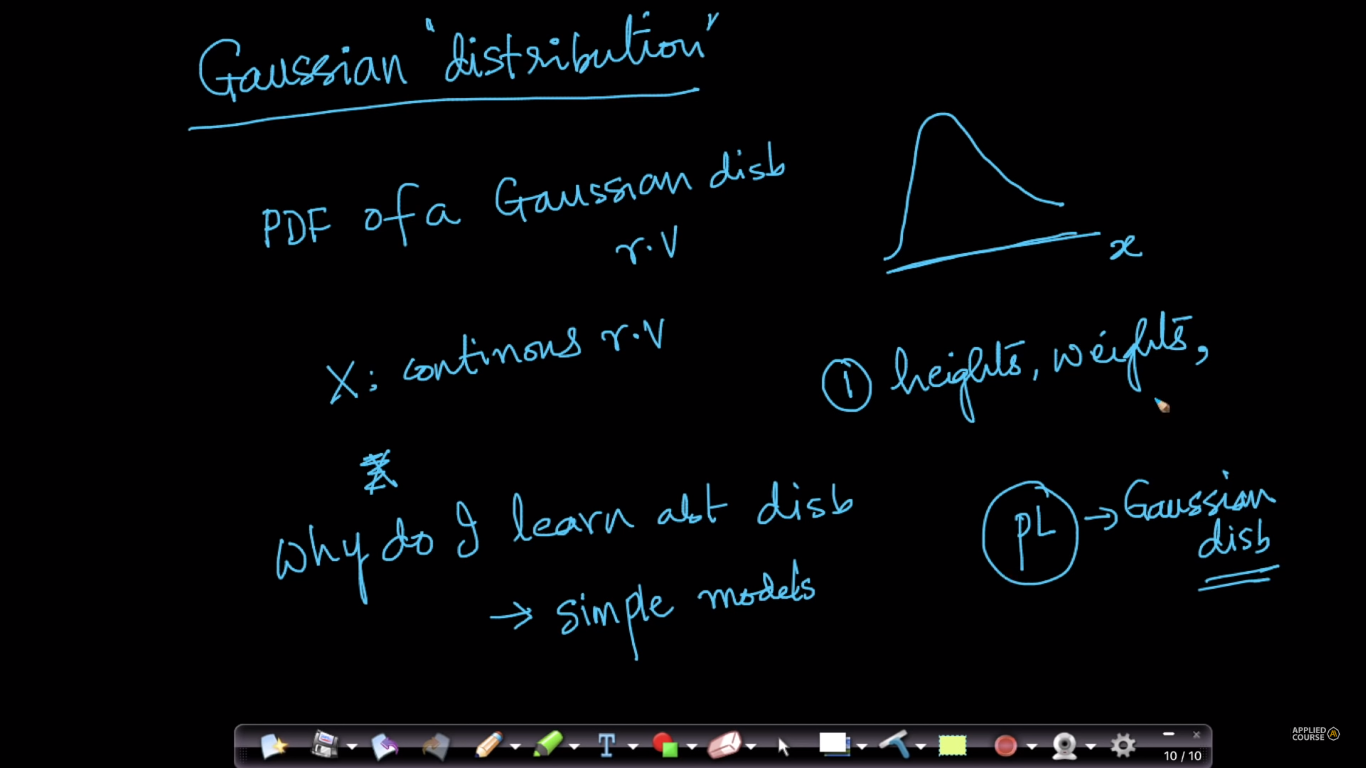
**Gaussian/Normal Distribution:**

The Gaussian distribution is a bell shaped curve.

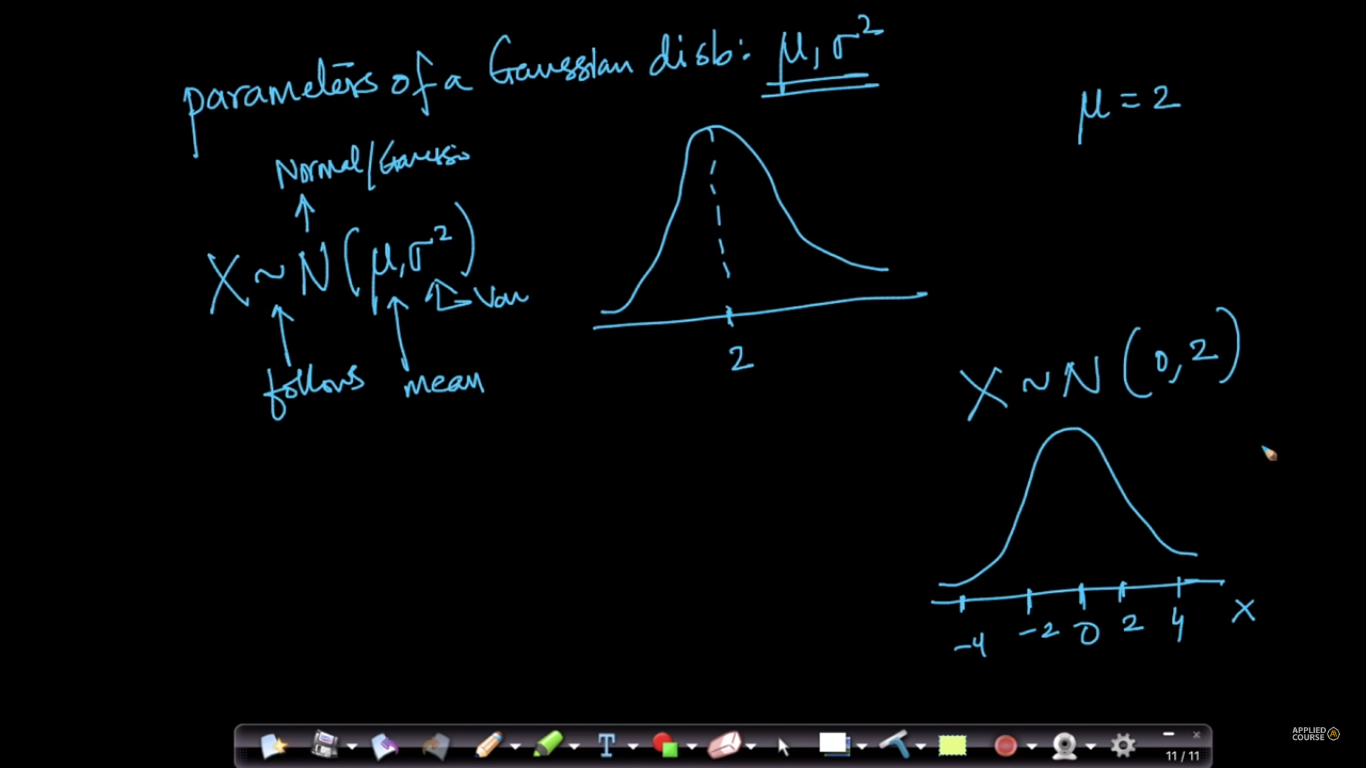
The normal distribution is a continuous probability distribution or the normal distribution is a [probability distribution](https://www.stattrek.com/Help/Glossary.aspx?Target=Probability_distribution)that associates the [normal random variable](https://www.stattrek.com/Help/Glossary.aspx?Target=Normal_random_variable)*X* with a [cumulative probability](https://www.stattrek.com/Help/Glossary.aspx?Target=Cumulative_probability)

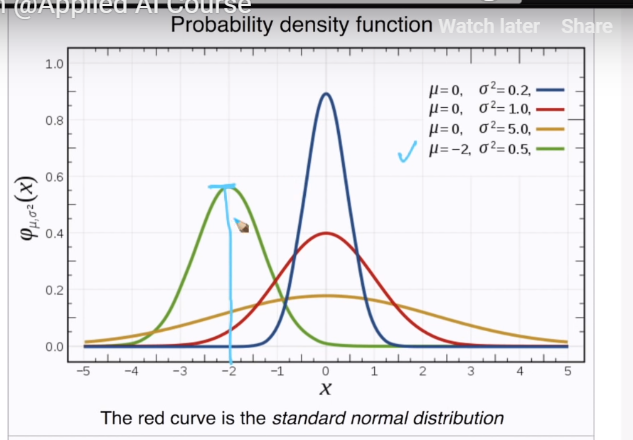
**Normal Random Variable:**

Many variables, such as pregnancy lengths, shoe sizes, foot lengths, and other human physical characteristics exhibit these properties: symmetry indicates that the variable is just as likely to take a value a certain distance below its mean as it is to take a value that same distance above its mean; the bell-shape indicates that values closer to the mean are more likely, and it becomes increasingly unlikely to take values far from the mean in either direction.

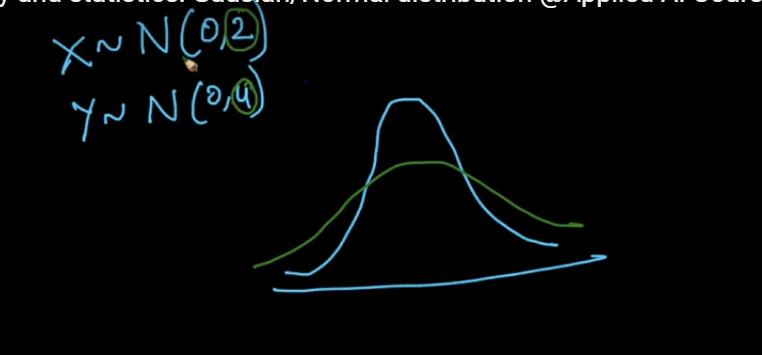
We can draw PDF if given data is gausian distributed, **only by mean and variance is provided**. These mean and variance is also known as parameters of gaussian/normal distribution.

* For normal distribution the peak of the curve lies on the mean
* variance tells the spread of the pdf curve
* Larger the variance, more will be spread(width) and shorter(height) will be the curve.
* Smaller the variance, smaller will be spread(width) and larger(height) will be the curve

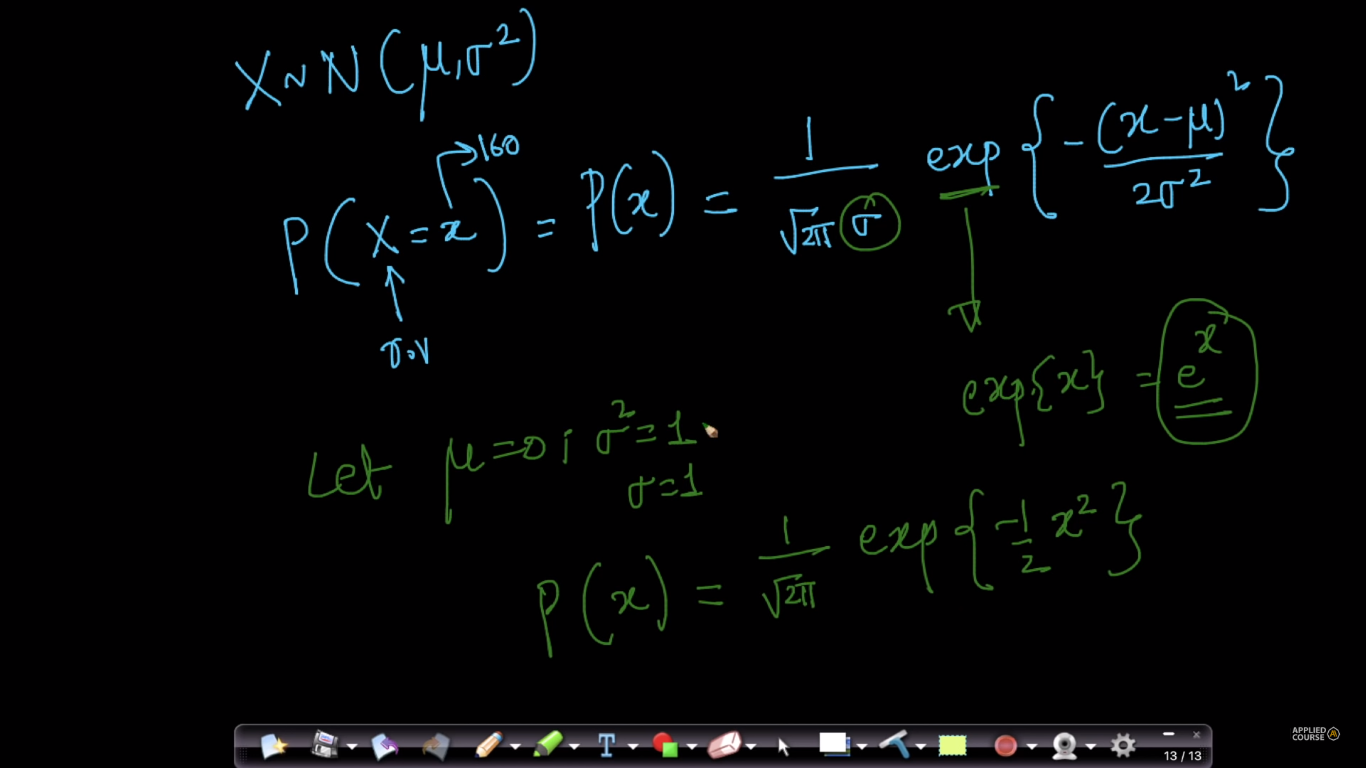


* As In below fig for a green curve the mean is -2 and it’s peak is at -2. These 4 curves also shows the smaller the variance, larger the height of the curve.

Therefor is someone says the mean is zero and variance and 2 and 4 respectively, then we can draw the fig for first one as peak at 0 and with smaller width and larger height(blue curve), and for second one as peak at 0 and with larger width and smaller height(green curve)

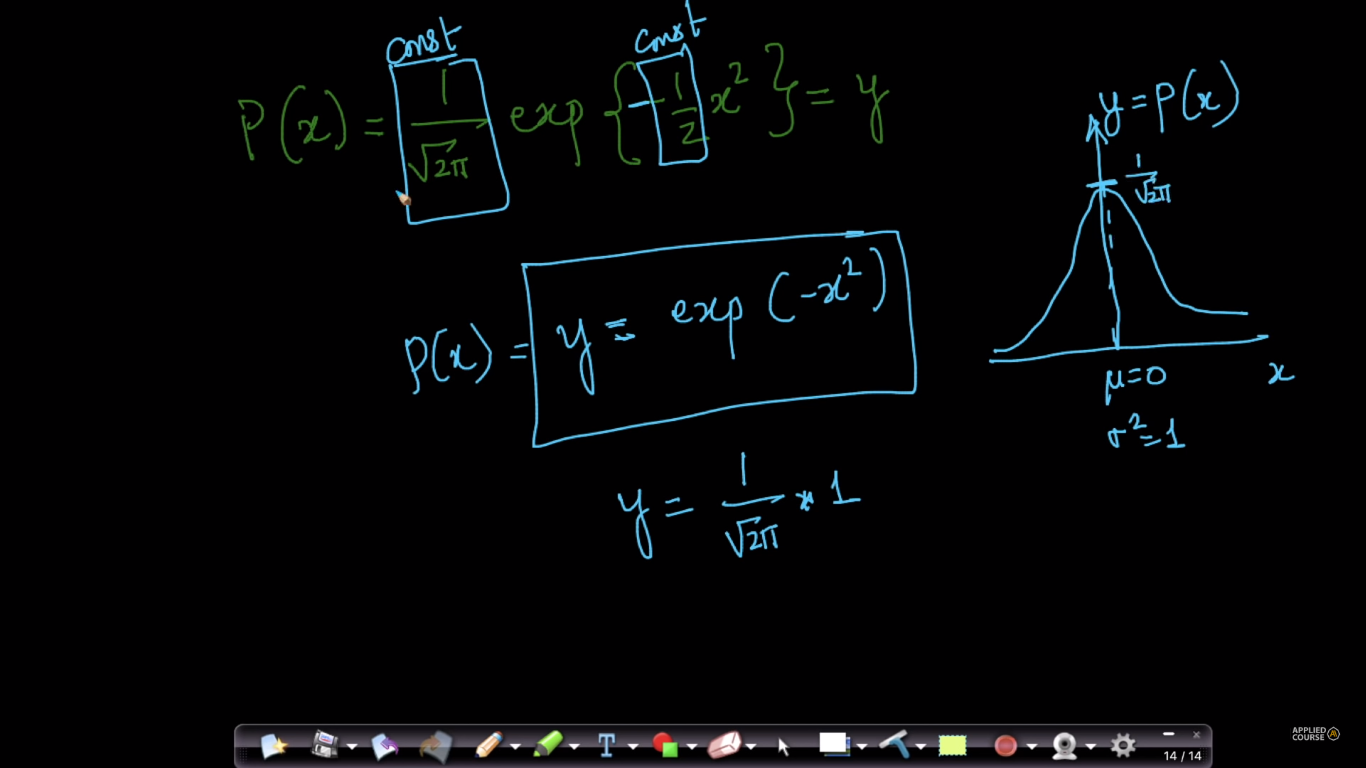


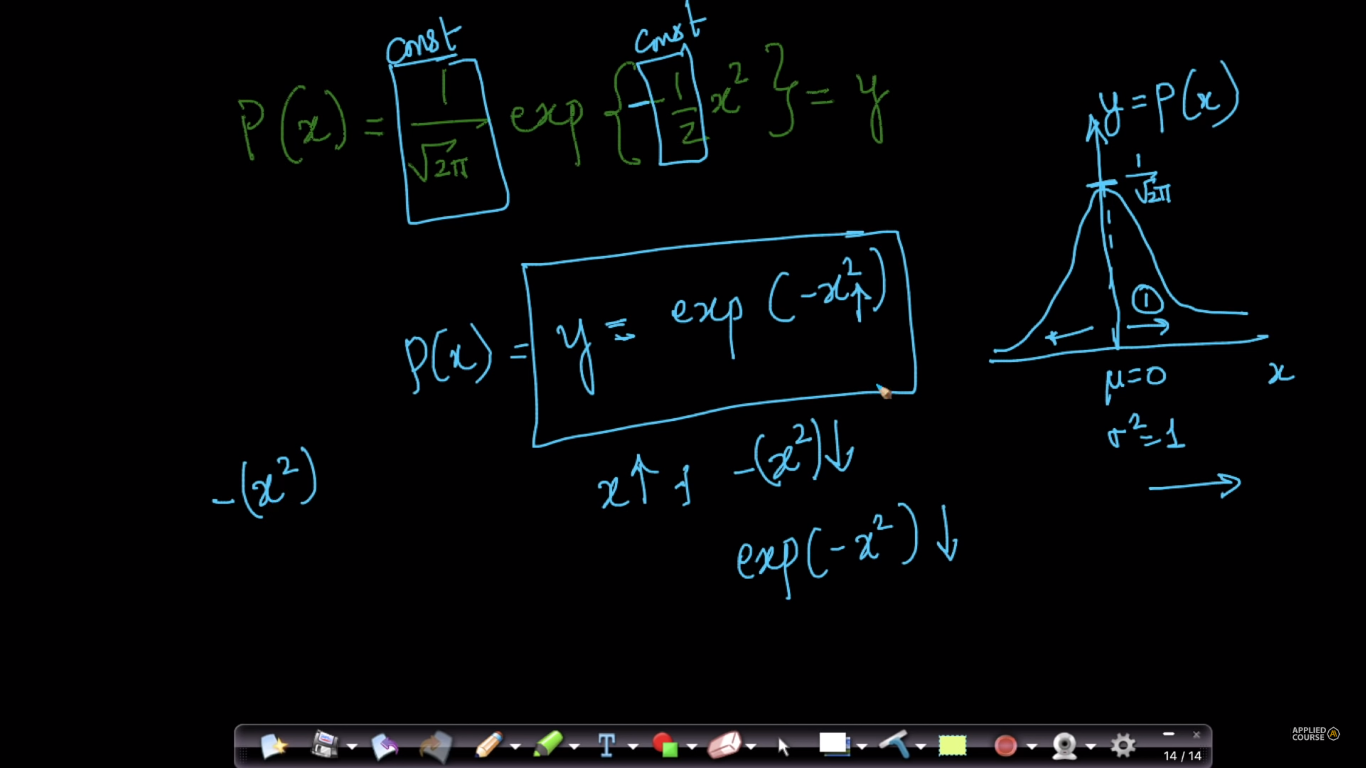
Given X which is normal distributed, then Probability density at a particular point let’s say **x** is given by eq given in below fig,



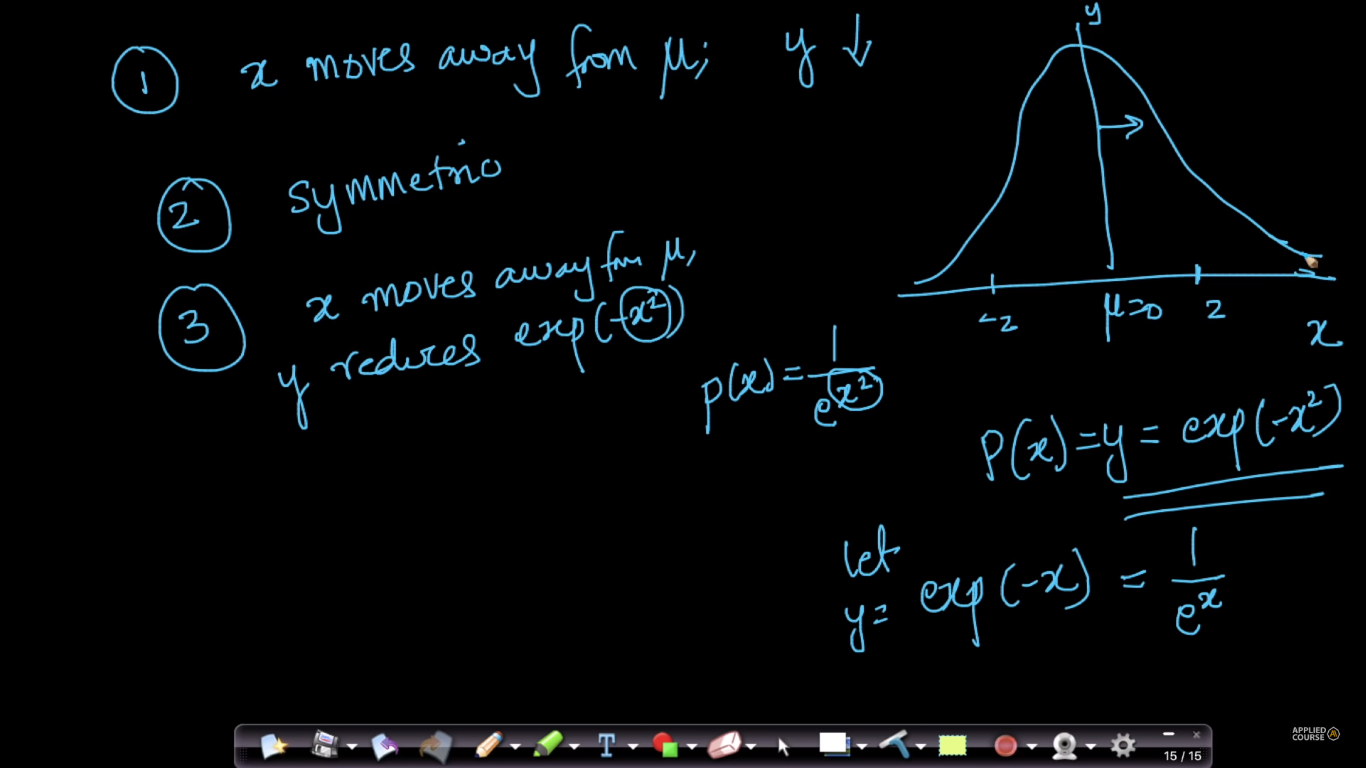
For understanding equation let’s say mean is 0 and variance is 1, so our new equation is given below.

Also 1/square root(2\*pie) and ½ are constants, so for understanding purpose of curve, we can remove them and therefore new equation is **e(-x2).**



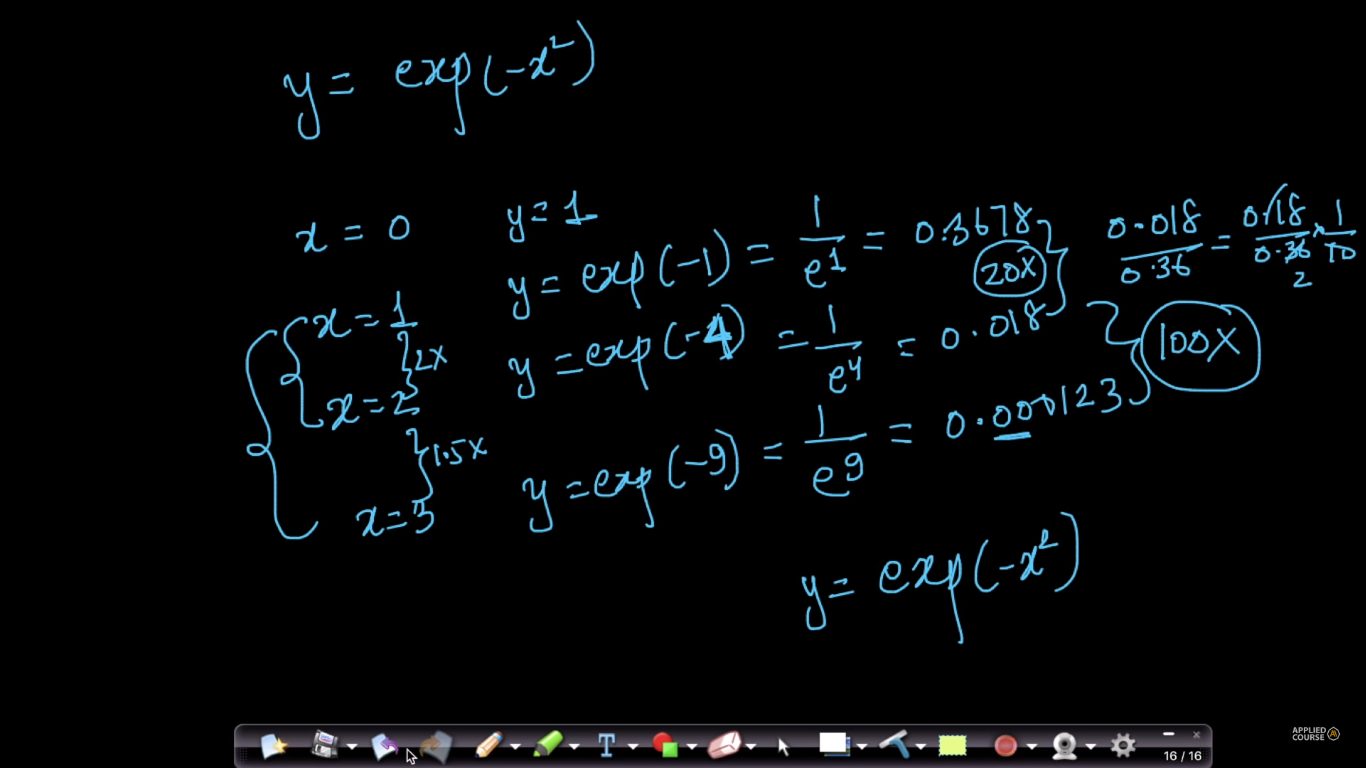
Now for this as we know for y = 1/ex, As x increases y decreases exponentially, and since here we have x2, so whether x will be positive or negative, for same x it generates same result irrespective of sign, hence we can say that curve is symmetric curve. 

So, on basis of above we can draw following conclusions.



To support conclusion of if x increases, y decreases, here is a below fig:

For small increase in x, y is decreasing by a large ratio.



Refer this to understand distribution deeply <https://www.analyticsvidhya.com/blog/2017/09/6-probability-distributions-data-science/>

What are the conditions for a function to be a probability density function ?

