**Polynomial Regression**

* Formula for polynomial regression is **y = b0 + b1x1 + b2x12 + …. + bnx1n**
* The bnx1n gives the regression line a parabolic effect, the curve becomes parabolic, and it fits the data better.
* Sometimes, the distribution of the data is more complex, it could also be called a non-linear distribution, and in situations like that, fitting the data into a linear model won’t be efficient.
* If we apply Linear Regression on more complex data, the generated model would be underfitted.
* So, to overcome the underfitting, we increase the complexity of the model.

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* In the above figures we can see that how the data is scattered and non-complex, and the linear model wasn’t able to capture the pattern of the data, and thus by applying a more complex type of regression model, we were able to find the relations between the dependent and independent variables much more efficiently.
* Polynomial regression is still considered to be a linear model as the coefficients associated with the features are still linear. X2 is only a feature. However, the curve that we are fitting is quadratic in nature.

**Why is it considered Linear Regression?**

* When we talk about linear and non-linear regression, we are not talking about the x variables, even though they are non-linear and the relation between x and y variable is non-linear, but we are talking about the coefficients (b values in the equation) which are linear.
* It is just a special case of multiple linear regression.