
# IIT Madras

## ONLINE DEGREE

**Mathematics for Data Science -1**
**Week 07-Tutorial 09**

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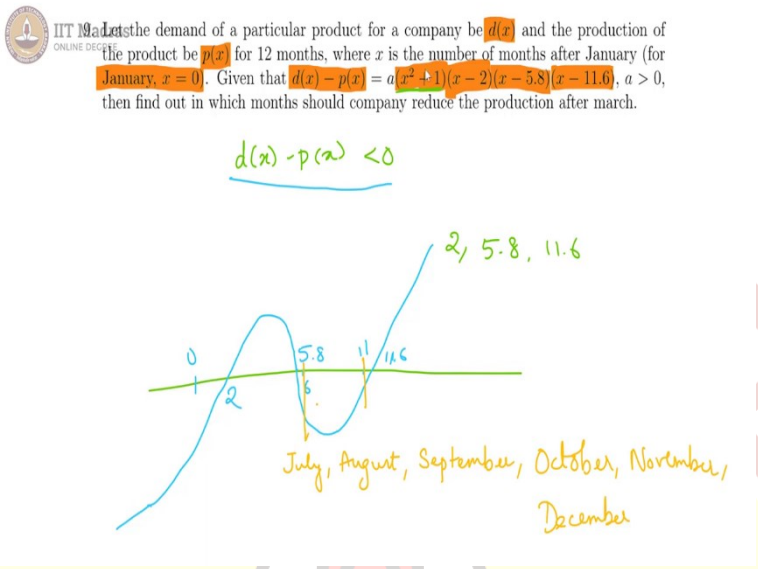


For our last question, there is a company and they are making a particular product and the demand of the particular product is us $d(x)$ , the production of the same product is $p(x)$ for 12 months, where $x$ is the number of months after January and for January we are taking $x$ is equal to 0. And then they have given us $d(x) - p(x)$, as a polynomial and this is essentially a quadratic multiplied by a monomial by another monomial and another monomial.

So, we have a fifth degree polynomial here $d(x) - p(x)$, then find out which months should company reduce production after March. So, reduced production would mean $p(x)$ is greater, that means $d(x) - p(x) < 0$ and we are interested in those situations where this curve is less than 0 and so we just try to graph this curve and $x^2 + 1$ has no real roots.

So, the only roots here are 2 and 5.8 and 11.6, so our curve is going to look something like and since $a$ is positive, then since the coefficient of the highest power is positive we will have this how polynomial go to $\infty$ as $x$ goes to $\infty$ and then we have a situation like this because this odd polynomial it goes to -$\infty$ here and there are only three roots, there is 2 and 5.8 and 11.6.

So, we are looking for when is it negative and that we have to do only in the 0 to 12 range because we are only looking for months of 1 year, actually even 12 is not correct because we are starting from 0 we are only going till 11. So, if the root is 11.6 then 11 is somewhere here

and this is a 5.8, 6 is somewhere here and so these are the months where you get negative. Now six is not June it is actually July because Jan is taken to be 0.

So, we have July and then August is 7, then September would be 8 and October is 9, November is 10 and December is 11 and all these months you have the function being, the polynomial being lesser than 0. So, these are the months where they should reduce production and they are mentioning after March, if we looked at it before March, then you would have also have to consider January and 0 and 1 which is January and February but since they are specifically saying after March this is the set of months where the company should reduce production, thank you.