



**IIT Madras**  
ONLINE DEGREE

## Mathematics for Data Science 1

### Week 06 - Tutorial 06

(Refer Slide Time: 0:14)

6. Let  $x$  be the number of years since 2000 (i.e.  $x = 0$  denotes the year 2000). The total amount generated (in Lakhs ₹) by selling a product is given by the function  $T(x) = 5x^4 + 3x^3 + x^2 + x$ . The different cost for that particular year are given in the table. What will the profit be for the particular year?

Cost type	Cost (in Lakhs ₹)
Purchase	$x^4 + x^3 + x^2$
Transportation	$x^3 + x^2 + x$
Miscellaneous	$0.5x^2 + 0.5x$

$$\begin{aligned}
 & \underline{5x^4 + 3x^3 + x^2 + x} - \underline{(x^4 + x^3 + x^2)} - \underline{(x^3 + x^2 + x)} - \underline{(0.5x^2 + 0.5x)} \\
 & \underline{4x^4 + x^3 - 1.5x^2 - 0.5x}
 \end{aligned}$$

In this question, let  $x$  be the number of years since the year 2000, so  $x = 0$  denotes the year 2000. And the total amount generated in lakhs by selling a product is given by  $T(x)$ . So, this is a polynomial which has the variable as a number of years since 2000, and the different cost of the particular years are given here. So, purchase cost is this polynomial, transportation cost is this polynomial, miscellaneous cost is this polynomial.

So, we now have to find out the profit for that year. So, that would just be  $T(x)$  minus all these cost. So, it is  $5x^4 + 3x^3 + x^2 + x - (x^4 + x^3 + x^2) - (x^3 + x^2 + x) - (0.5x^2 + 0.5x)$ . So, this would be the total profit and for that we now have to look at the each  $x$  power term.

So,  $x^4$ , there are 2 terms,  $5x^4$  and  $-x^4$ . So, we get  $4x^4$  and  $x^3$  there are 3 terms,  $3x^3$ , and  $-x^3$  and  $-x^3$  here. So, we get  $x^3$  and  $x^2$  square terms there are 4, there is this  $x^2$  and then there is this  $-x^2$  and another  $-x^2$  and minus  $-0.5x^2$ .

So, that will give us minus  $1.5x$  square because this and this cancels off and then we get  $-1.5x^2$ . And lastly the  $x$  term there is  $x$  and  $-x$  which cancels off and  $-0.5x$ . So,  $-0.5x$ . So, this would be the total profit for that year.