INDIAN INSTITUTE OF TECHNOLOGY MADRAS
सिद्धिर्भवति कर्मजा

IIT Madras

ONLINE DEGREE

Mathematics for Data Science 1
Week 05 - Tutorial 07

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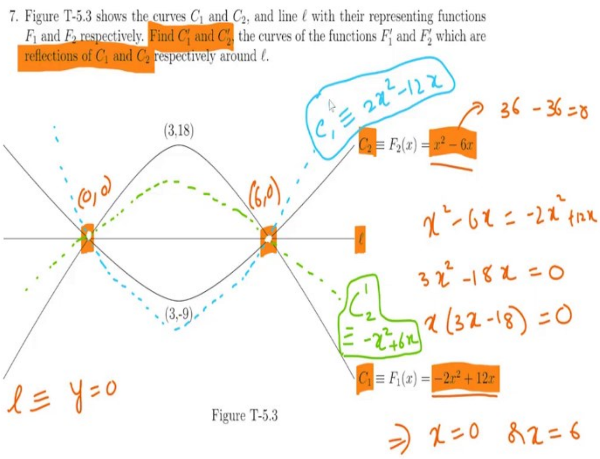

In this question there are these two curves C_1 and C_2 which are both quadratic curves and there is this line l which is passing through these two intersection point. So, line l is passing through the intersection points of these two parabolas. They are asking find C_1' and C_2', the curves of the functions F_1' and F_2' which are reflections of C_1 and C_2 respectively around l which means for C_1 the reflection would be something like this, about l it would be something like this and for C_2 the reflection would be something like this and these are what we are trying to find out, C_1' and C_2'.

So, this should be C_2' and this would be C_1'. For all of these, we have to first find the line l and that we can find when we solve for the equality of these two functions. So, we are taking $x^2 - 6x = -2x^2 + 12x$. And that gives us $3x^2 - 18x = 0$ and that further gives us $x\,(3x - 18) = 0$ that indicates $x = 0$ or $x = 6$.

So, this point has coordinate $x = 0$ and this point has coordinate $x = 6$. We need to find the y coordinates for these points now. For that we substitute $x = 0$ and we get in this equation or this equation I wrote this and we get $y = 0$. So, this point is essentially the origin. Whereas, for this point we substitute $x = 6$ and we get $36 - 36$ which is 0. So, this point would then be (6, 0).

So, essentially this is a horizontal line which is $y = 0, l$ is $y = 0$. So, now we are just looking for reflections about the x axis because $y = 0$ as the x axis. And that would give us directly the negative coefficients of the same things. So, C_1' would then be $2x^2 - 12x$ whereas, C_2' would now be $-x^2 + 6x$. Thank you.