IIT Madras

ONLINE DEGREE

(Refer Slide Time: 0:14)

3. Rather than fitting a quadratic in above case we can fit two linear equations ℓ_1 and ℓ_2 respectively as shown in Figure.

Figure T-5.1
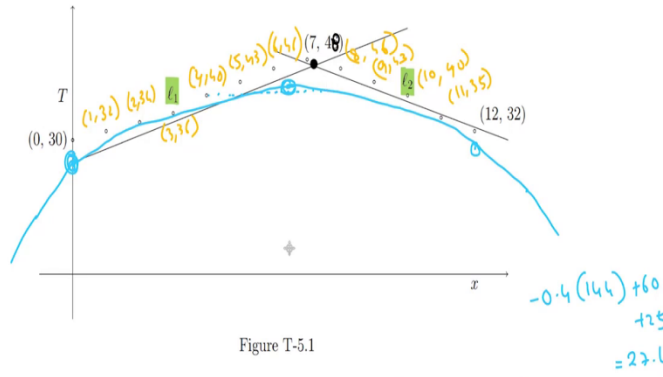
Given that:
$\ell_1 \equiv T = 3x + 25, \quad x \in [0, 7]$
$\ell_2 \equiv T = -3x + 67, \quad x \in [7, 12]$
Draw a rough sketch of quadratic equation $(T(x) = -0.4x^2 + 5x + 25$, vertex $\equiv (6.25, 40.625))$
mentioned in question 2 with respect to these two lines.

A third Question is related to the second question. So, in case you have not the second question please go back and see it. And here we are trying to say that instead of fitting a quadratic we can fit two linear equations l1 and l2. They have already provided us with the two equations which are this and this. So, $l_1 : y = 3x + 25$ and $l_2 : y = -3x + 67$ and the curves are already given.

Now the question is asking us to draw rough sketch of the quadratic equation that was fit and the vertex is also provided for us with respect to these two lines. So, I think it is useful if we can just mark out the points here. So, $(0, 30), (7, 46)$ and $(12, 32)$ are already given. The remaining ones were, this is $(1, 32)$, this is $(2, 34)$, this one is $(3, 36)$, this one is $(44, 40)$, this is $(5, 43)$, this is $(6, 46)$. So, this question has a problem here this should be $(7, 48)$ that point.

And this is $(8, 46)$ again and this is $(9, 43)$ and this point is $(10, 40)$ this is $(11, 35)$ and that may have $(12, 32)$. So, these are points and for us to do the rough sketch. The vertex is at 6.25 so the vertex should somewhere here and it is at 40.625. So, this is the horizontal $(4, 40)$, then vertex is somewhere here. So, clearly our quadratic is below the points that we have been given. And this being the x^2 coefficient is -0.4 which is less than 0 so it is a down turned parabola.

And let us look at the two points that we know for sure 0 and $x = 0$ this parabola is going to give us 25 the quadratic equation going to give us 25. Which is definitely below so somewhere here it appearing to be intersecting with this line. So let us look at, we have $3x + 25$ so at $x = 0$ the quadratic equation and the l1 line meet. And $x = 12$, we have 0.4 into $-0.4 \times (144) + 60 + 25$ which give us about 27.4, I think.

So, that is below this somewhere here so our quadratic is going to look like this. Something like this so it is quite inaccurate for the given data. So, this is a very bad curve fit.