

IIT Madras
ONLINE DEGREE

Mathematics for Data Science 1 Week 07- Tutorial 05

(Refer Slide Time: 0:14)



5. Electrocardiogram refers to the recording of electrical changes that occur in the heart during a cardiac cycle. It may be abbreviated as ECG or EKG. The electric signal produced by the heart muscle are shown in the figure below.

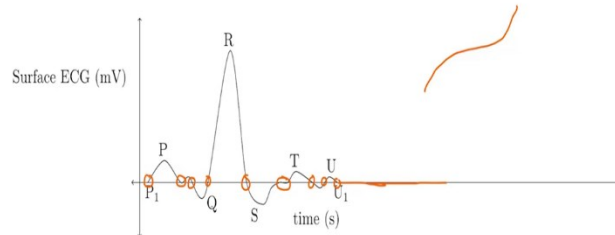


Figure T-7.3

- (a) Identify the number of turning points and also the minimum sum of multiplicities of the polynomial so formed by ECG?
- (b) No electrical activity i.e., flat lined surface ECG usually indicates the death of a person. This is as shown in the figure after U_1 . What polynomial will it be called for the domain after U_1 ?

9

$$1+2+1+1+1+3+1+1=12$$

Zero polynomial.

In this question, we are looking at an Electrocardiogram which is often called ECG or EKG. This is a recording of electrical changes that occur in your heart during a cardiac cycle. So here we have some ECG shown to us as a polynomial. And they are asking identify the number of turning points. Ok? So that will be 1, this is 2, this is 3, 4, 5, 6, and here this is not a turning point, it is flattening out like this and rising. Therefore it is not a turning point. We already have 1,2,3,4,5,6 so this is 7,8,9. That means we have 9 turning points. And then they are asking for the minimum sum of multiplicities for that we look at the roots and so this one is directly cutting through this root is directly cutting through the axis.

So the multiplicity of this is 1 and here this is touching and coming back so it has to have an even multiplicity. So the minimum is 2 and then here again this and this are both 1 each +1, this 1 also should be 1. And here we see this flat lined situation which occurs when you have an odd multiplicity but not 1. So the minimum there would be 3 and then this is a 1 this is a 1 and this also has to be 1.

So plus 1 + 1 + 1 which gives us all put together 3, 4, 5, 6, 9, 10, 11, 12, 12. So the minimum sum of multiplicities is 12. No electric activity that is flat lined surface ECG usually indicates the death of a person. This is as shown in the figure after U_1 so after U_1 we presume that it is a, it is

basically along the x axis what polynomial will it be called for the domain after U_1 . Clearly a 0 polynomial. It is simply y is equal to a constant. So it has no degree and it is a 0 polynomial.

