NPTEL

NPTEL ONLINE CERTIFICATION COURSE

Discrete Mathematics
Graph Theory – 3 &
Generating Functions

NetworkX - Eulerian graphs

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We are now going to move ahead and learn more about Eulerian graphs, we will see if some graphs are Eulerian or not, and we'll also be able to obtain the Eulerian circuit.

Now I am going to import NetworkX as nx as the first step, now I'm going to create this graph G as nx.complete_graph on let's say 5 vertices, now the next question is nx.is_eulerian, now which graph it is G,
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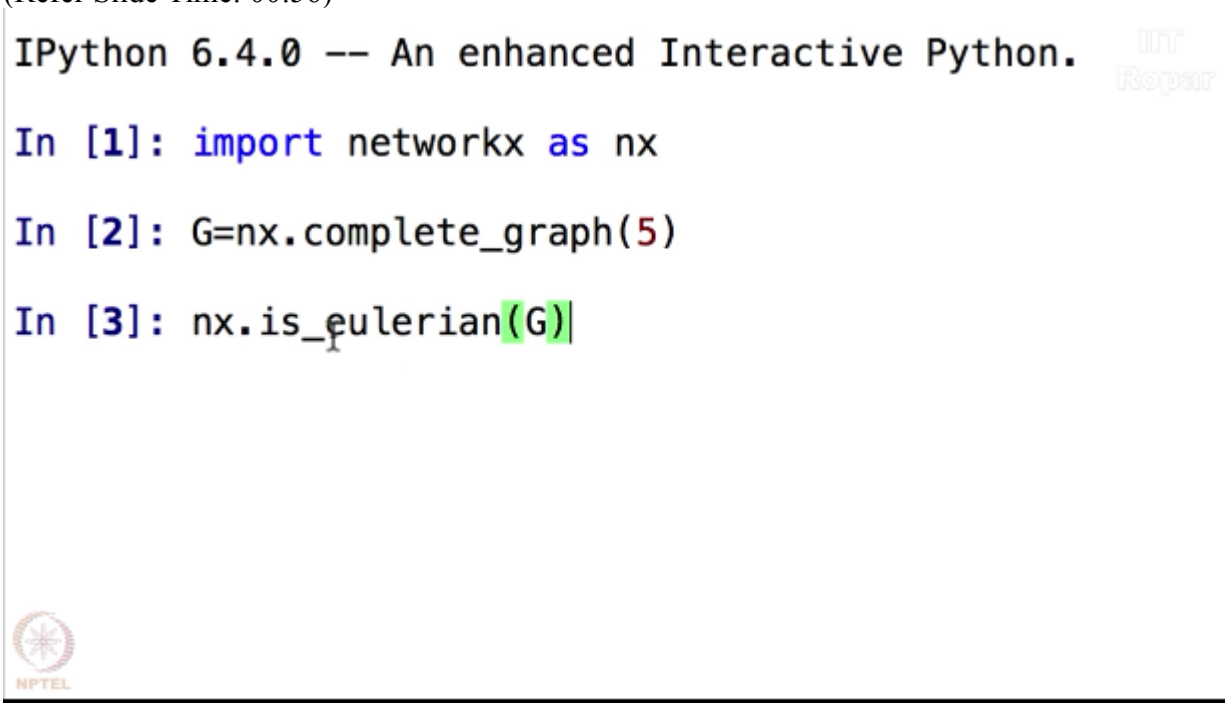

so this command is going to tell me if the graph is Eulerian or not, it says true, well this graph is Eulerian, instead of making it 2 commands first creating the graph and then checking if it is Eulerian I can rather do it this way, nx.is_eulerian (nx.petersen_graph)
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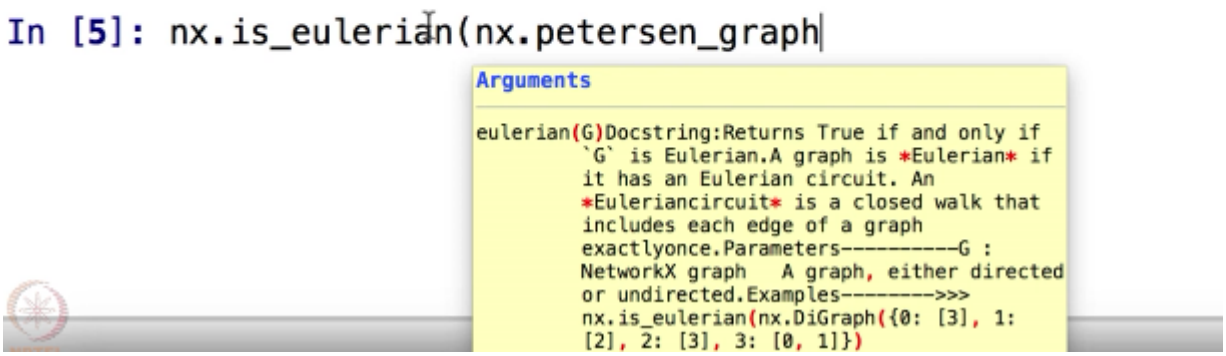

so this command is capturing both creation of the graph and checking if it is Eulerian or not, let us see well it's says false, so Petersen graph is not Eulerian, so we can verify this way whether a graph is Eulerian or not.

Now we have to even obtain Eulerian circuit if it is Eulerian, so let me check how to do that? So we have a graph G with us nx., okay let me clear the screen first, so let me create the graph now G = nx.complete_graph on let's say 5 vertices, so the graph has got created, now this graph as we know is Eulerian, let us take list nx.eulerian_circuit, so this graph is, this command list nx.eulerian_circuit (G) is going to give me the list of the nodes which form the Eulerian circuit.

Now do you observe here
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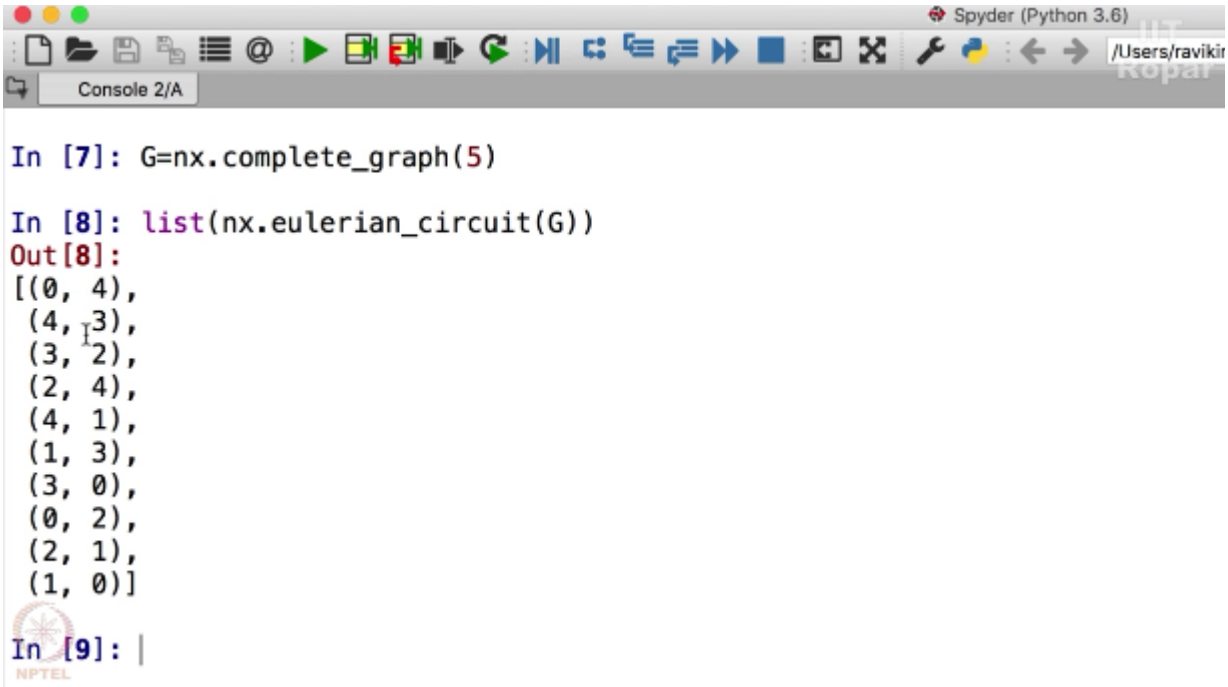

(0, 4) (4, 3) (3, 2) (2, 4) (4, 1) (1, 3) (3, 0) (0, 2) (2, 1) and (1, 0) so these are the edges which form the Eulerian circuit, in the videos we had shown you the vertices so going that way it will be (0, 4) 3, 2, 4, 1, 3, 0, 2, 1, 0 so for completeness sake let us just draw it nx.draw (G) and with labels equals true,

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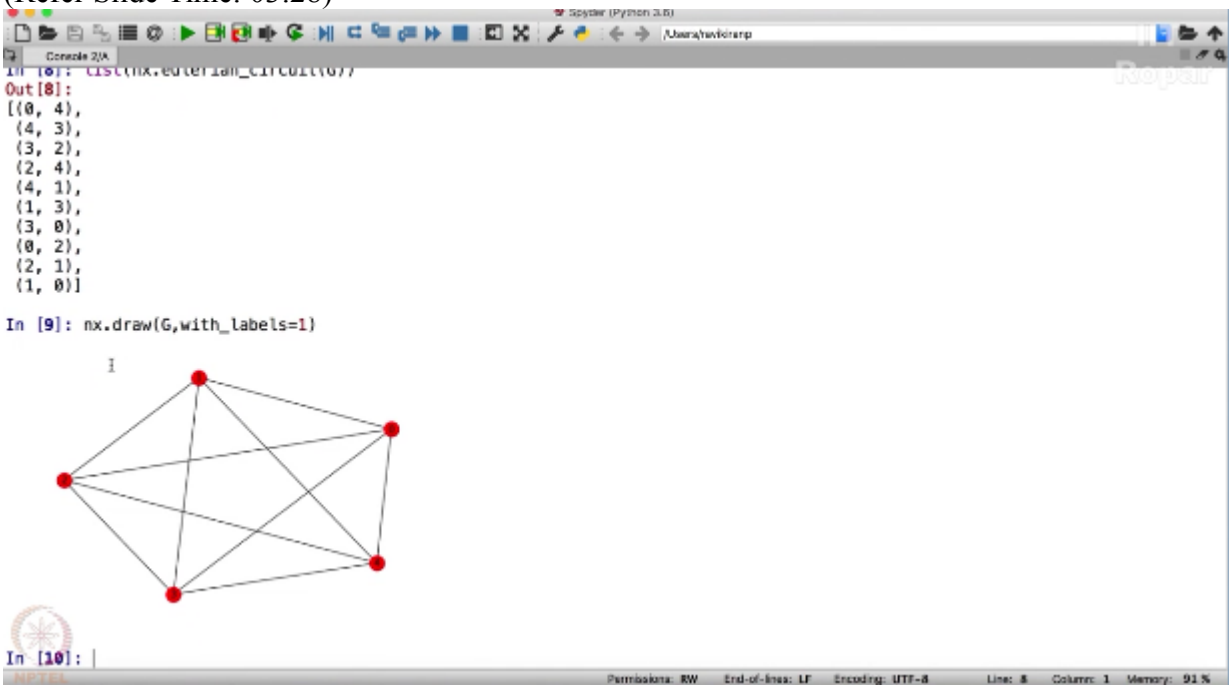

so you see here, now you can probably compare it with this and check if the graph is really Eulerian, well it is, you have obtained the edges here, right, you have obtained the Eulerian circuit, so this way you can obtain Eulerian circuit and check if a graph is Eulerian or not.

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