**Uhusiano wa Euler - manukuu**

1

00:00:26,000 --> 00:00:30,999

Hello kila mtu! Karibu

katika kipindi hiki kinachohusu topolojia,

2

00:00:31,000 --> 00:00:36,500

na haswa zaidi kwa grafu zilizopangwa,

ambayo ni sehemu ya mchanganyiko.

3

00:00:37,000 --> 00:00:39,700

Hivyo tunakwenda kuanza kikao hiki.

4

00:00:41,000 --> 00:00:44,999

Kwa kikao hiki utahitaji

karatasi ndogo za karatasi;

5

00:00:45,000 --> 00:00:50,000

kalamu chache (sio lazima rangi);

6

00:00:51,000 --> 00:00:54,000

mtawala aliyehitimu; na kutoka karatasi moja hadi

vigae.

7

00:00:54,500 --> 00:00:58,500

Kama nilivyokuambia, tutaenda kusoma

grafu zilizopangwa.

8

00:01:00,000 --> 00:01:02,100

Bora ni kuanza kwa kuchora baadhi

baadhi

9

00:01:02,500 --> 00:01:05,000

basi ngoja nikuambie jinsi gani

kuchora yao.

10

00:01:05,200 --> 00:01:08,900

Ili kuchora grafu iliyopangwa, tu

kwanza chora wima,

11

00:01:09,000 --> 00:01:12,000

ambayo nitafanya na miduara ya kijani.

12

00:01:18,000 --> 00:01:25,500

Kisha unganisha tu wima hizi

kwa kingo.

13

00:01:27,000 --> 00:01:29,900

Inaruhusiwa kabisa kuunganisha a

kilele kwa yenyewe

14

00:01:30,000 --> 00:01:34,000

unaweza kufanya kitanzi kama hiki.

15

00:01:35,700 --> 00:01:42,000

Unaweza pia kuchora kingo nyingi

kati ya wima mbili, kama hii.

16

00:01:42,500 --> 00:01:44,000

Hii inaruhusiwa!

17

00:01:47,000 --> 00:01:49,900

Ili kuchora grafu iliyopangwa, tunahitaji

fuata sheria mbili tu.

18

00:01:50,000 --> 00:01:55,900

Kanuni ya kwanza ya kufuata ni hiyo

wakati wa kuchora kingo kati ya wima

19

00:01:56,000 --> 00:01:59,900

kingo lazima zisivuke.

Kwa hivyo hali hii hairuhusiwi.

20

00:02:00,000 --> 00:02:04,900

Utawala namba 2: mwishoni, grafu ambayo sisi

inapata (tunapata grafu mara moja

21

00:02:05,000 --> 00:02:07,900

(tunapata grafu mara tu tunayo

kingo na wima zilizochorwa)

22

00:02:08,000 --> 00:02:10,900

grafu inayosababisha lazima iunganishwe.

23

00:02:11,000 --> 00:02:14,500

Hiyo ni kusema, ikiwa tunataka kwenda kutoka kwa moja

vertex kwa mwingine,

24

00:02:14,600 --> 00:02:19,900

lazima kuwe na njia yenye kingo,

ambayo inawaunganisha.

25

00:02:20,000 --> 00:02:24,000

Isipokuwa kwamba hapa katika mfano huu, kuna mbili

seti za kingo na wima

26

00:02:24,100 --> 00:02:27,900

ambazo hazijaunganishwa na kila mmoja,

kwa hivyo grafu imekatwa.

27

00:02:28,000 --> 00:02:35,500

Ili grafu hii ikubalike, inatosha

kuchora makali kati ya seti hizi.

28

00:02:35,600 --> 00:02:38,900

Ninachopendekeza kwako ni kuchora baadhi

kati ya 5 na 10.

29

00:02:39,000 --> 00:02:42,900

Kwa hivyo sitisha video,

na chukua karatasi zako ndogo

30

00:02:43,000 --> 00:02:46,500

na kwenye kila karatasi,

unachora grafu.

31

00:02:52,500 --> 00:02:56,900

Sawa! Kwa mfano, nilichora 8

kwenye karatasi 8 tofauti.

32

00:02:58,000 --> 00:02:59,000

Chukua grafu hii kwa mfano.

33

00:02:59,100 --> 00:03:02,900

Kuna mambo mengi unaweza

angalia grafu hii.

34

00:03:03,000 --> 00:03:05,400

Kwanza, tunaweza kuangalia idadi ya

vilele,

35

00:03:05,500 --> 00:03:08,200

vipeo ni duara katika kijani hapa.

36

00:03:08,300 --> 00:03:12,000

Wacha S iwe idadi ya wima.

37

00:03:13,000 --> 00:03:16,700

Ili kuhesabu idadi ya wima ikiwa wewe

kuwa na grafu ngumu kiasi,

38

00:03:16,800 --> 00:03:18,999

ninachopendekeza kwako ni,

unavyowahesabu

39

00:03:19,000 --> 00:03:30,500

unaweza kujaza wima.

Kwa mfano hapa tuna wima 1, 2, 3, 4, 5, 6

40

00:03:30,600 --> 00:03:33,500

Kwa hivyo S ni sawa na 6.

41

00:03:35,000 --> 00:03:38,000

Na tutaona A idadi ya kingo.

42

00:03:38,500 --> 00:03:42,000

Sawa na wima, ikiwa unayo a

grafu kiasi fulani ngumu,

43

00:03:42,400 --> 00:03:45,999

unaweza kufanya makosa (kusahau makali

au hesabu moja mara mbili)

44

00:03:46,000 --> 00:03:48,700

kwa hivyo ninachopendekeza kwako kuhesabu

idadi ya pembe,

45

00:03:48,800 --> 00:03:51,000

ni kuvuka kila makali unayohesabu.

46

00:03:51,100 --> 00:04:05,000

Kwa mfano, hapa tunayo 1, 2, 3, 4, 5, 6, 7, 8,

9, 10 matuta. Kwa hivyo A=10.

47

00:04:06,000 --> 00:04:10,000

Hatimaye, vitu vya mwisho ambavyo tunaweza kuwa navyo

na grafu iliyopangwa, hizi ni nyuso.

48

00:04:10,200 --> 00:04:14,500

Kuhesabu idadi ya nyuso,

Ninapendekeza uanze kutoka katikati ya makali

49

00:04:14,600 --> 00:04:18,500

kwa mfano hii,

unafuata mkondo kwa mwelekeo mmoja

50

00:04:18,600 --> 00:04:22,000

kwa mfano huyu.

51

00:04:22,500 --> 00:04:26,500

Na mwisho wa kurudi mahali pa kwanza.

52

00:04:26,600 --> 00:04:31,900

Na mzunguko huo

hii inafafanua sura ya grafu yako.

53

00:04:32,000 --> 00:04:34,500

Tutazingatia F idadi ya nyuso.

54

00:04:46,000 --> 00:04:47,900

Pia usisahau kutoka nje:

55

00:04:48,000 --> 00:04:51,500

ukianza kutoka kwa hatua hii kwa mfano

na unafuata grafu

56

00:04:51,550 --> 00:04:56,500

katika mwelekeo mmoja, kwa mfano mwelekeo huu

Vizuri utaona kwamba una

57

00:04:56,550 --> 00:05:02,000

kufuata sehemu nzima ya nje ya grafu.

Hii inaunda uso wa nje.

58

00:05:02,200 --> 00:05:07,800

Usisahau kuhesabu upande huu pia.

59

00:05:08,000 --> 00:05:14,000

Na kwa hivyo tuna nyuso ngapi?

Ambapo katika 1, 2, 3, 4, 5 na 6. Kwa hivyo F=6.

60

00:05:19,000 --> 00:05:22,900

Ninataka kukuonyesha sampuli hii ya grafu

kwa sababu yeye ni maalum kidogo

61

00:05:23,000 --> 00:05:27,000

Kwa kweli, unaona hapa kingo

ambazo zimetengwa kwa kiasi fulani.

62

00:05:27,050 --> 00:05:30,500

Nitakuonyesha kidogo ili usifanye

hukukosea.

63

00:05:37,000 --> 00:05:40,000

Hapo unaona kwamba tunapita mwingine

mara ya pili kwenye kingo hii

64

00:05:41,000 --> 00:05:44,500

na unaona kwamba mwishoni, tutarudi kwenye

pa kuanzia.

65

00:05:45,000 --> 00:05:49,000

Na hivyo huko, uso wa nje una sura

ajabu kidogo,

66

00:05:50,000 --> 00:05:51,500

lakini bado ni upande.

67

00:05:51,600 --> 00:05:57,000

Ninachopendekeza kwako ni kuchukua yote

grafu zako na uhesabu kwa kila grafu

68

00:05:57,100 --> 00:06:01,500

idadi ya wima, idadi ya kingo na

idadi ya pande, na uandike hapa chini.

69

00:07:15,000 --> 00:07:19,200

Maintenant que vous avez compté le nombre

de sommets, d'arêtes et de faces,

70

00:07:19,300 --> 00:07:21,500

d'abord vous allez tracer deux axes :

71

00:07:21,600 --> 00:07:27,500

un axe vertical avec votre règle graduée

et un axe horizontal.

72

00:07:28,000 --> 00:07:33,900

L'axe horizontal, vous allez le graduer

entre 1 et une vingtaine,

73

00:07:34,000 --> 00:07:35,700

et de même pour l'axe vertical.

74

00:07:35,800 --> 00:07:39,200

Les graduations doivent être régulièrement espacées.

75

00:07:39,400 --> 00:07:41,800

Pour chaque feuille,

vous allez prendre votre graphe,

76

00:07:41,900 --> 00:07:44,900

et l'axe horizontal correspond au nombre d'arêtes.

77

00:07:45,000 --> 00:07:48,900

L'axe vertical correspond au nombre de faces plus le nombre de sommets.

78

00:07:49,000 --> 00:07:54,900

A vaut 10, donc on va se placer sur l'axe horizontal au niveau du chiffre 10.

79

00:07:55,000 --> 00:08:02,500

Si vous calculez S+F, ça fait 6+6 donc 12, donc vous allez monter jusqu'à la graduation 12.

80

00:08:02,600 --> 00:08:05,500

Et vous allez tracer une croix ici.

81

00:08:05,600 --> 00:08:06,500

Mettez en pause la vidéo,

82

00:08:06,600 --> 00:08:10,000

et pour chaque graphe que vous avez dessiné, vous allez tracer un point.

83

00:08:56,000 --> 00:08:59,000

Sawa!

Vous avez obtenu des points sur un gaphe.

84

00:08:59,100 --> 00:09:03,500

Maintenant, je vais vous demander de mettre en pause la vidéo (encore une fois)

85

00:09:03,600 --> 00:09:08,900

et de discuter entre vous de la particularité de ces points que vous obtenez.

86

00:09:09,000 --> 00:09:12,000

Savez-vous pourquoi il y a une telle caractéristique ?

87

00:09:17,000 --> 00:09:23,900

Alors vous avez probablement remarqué

que tous les points, normalement, sont alignés.

88

00:09:24,000 --> 00:09:29,500

C'est-à-dire que, si vous prenez votre règle,

et que vous tracez une droite,

89

00:09:29,600 --> 00:09:33,500

vous allez arriver à tracer une droite qui

passe par tous les points.

90

00:09:33,600 --> 00:09:37,000

Je vous invite à tracer cette droite.

91

00:09:43,000 --> 00:09:50,000

Et vous allez voir que cette droite passe,

au niveau de l'axe vertical,

92

00:09:50,100 --> 00:09:53,100

au niveau du chiffre 2 (normalement).

93

00:09:58,000 --> 00:10:01,000

Comme équation, l'équation suivante,

94

00:10:01,100 --> 00:10:18,000

c'est-à-dire F+S = A+2

95

00:10:20,000 --> 00:10:24,500

Voilà.

Ou alors, écrit d'une autre manière,

96

00:10:24,600 --> 00:10:29,000

donc de manière équivalente, on peut aussi

faire passer le A de l'autre côté,

97

00:10:30,000 --> 00:10:39,000

et donc on obtient F-A+S=2

98

00:10:43,000 --> 00:10:44,900

Pourquoi a-t-on une telle équation ?

99

00:10:45,000 --> 00:10:50,000

Je vous laisse en discuter quelques instants

entre vous, donc mettez en pause la vidéo.

100

00:10:57,000 --> 00:11:02,500

Sasa kwa kuwa umejadili kidogo

kujua jinsi uhusiano huu ni wa kweli,

101

00:11:02,600 --> 00:11:09,000

uhusiano huu F-A+S=2,

Ninapendekeza uionyeshe.

102

00:11:14,500 --> 00:11:18,600

Uhusiano huu unaitwa

Uhusiano wa Euler,

103

00:11:18,700 --> 00:11:22,000

d'après le nom du mathématicien Leonhard Euler.

104

00:11:22,200 --> 00:11:25,000

Voilà, merci d'avoir suivi cette vidéo !

105

00:11:25,800 --> 00:11:31,000

Fahamu kuwa fomula zinazofanana zipo

aussi pour des graphes non-planaires

106

00:11:31,200 --> 00:11:35,100

(ce sont des graphes où l'on peut autoriser

aussi des croisements)

107

00:11:36,000 --> 00:11:39,900

et cette relation d'Euler est vraiment

universelle et c'est pour ça que

108

00:11:40,000 --> 00:11:42,000

je la trouve très belle.

109

00:11:43,000 --> 00:11:46,900

Les chercheurs et les chercheuses qui font de

la combinatoire l'utilisent très souvent

110

00:11:47,000 --> 00:11:51,500

pour classer les graphes qu'iels étudient.

111

00:11:52,500 --> 00:11:57,000

Merci beaucoup d'avoir suivi cette vidéo et

à bientôt !