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2-bosqich talabasi

Toshqobilov Shamshodbek ning
Kriptografiyaning matematik asosi
fanidan bajargan
5,6-Amaliy ishlari

713-23 guruh
MFC002-2

Fan o’qituvchisi: Qozoqova To‘xtajon
Qaxramon qizi

Eyler funksiyasi, berilgan modul bo‘yicha birlamchi ildizni hisoblashni SageMath instrumenti orqali amalga oshirish:

20-variant:

5-amaliy ish:

Eyler funksiyasi va uning ahamiyati, berilgan modul bo‘yicha birlamchi ildizni hisoblash bo‘yicha amaliy ko‘nikmalarga ega bo‘lish.

1) Berilgan qiymat bo‘yicha Eyler funksiyasi qiymati hisoblansin

n = 66; 66 – Murakkab son va uni ishlasa bo’ladi:

66 = 2*3*11

$\phi(66) = 66 * (1-1/2) * (1-1/3) * (1-1/11) = 66 * (1/2) * (2/3) * (10/11) = 20$;

Demak, berilgan qiymat bo‘yicha Eyler funksiyasi qiymati 20 ga teng ekan.

2) Berilgan modul bo‘yicha birlamchi ildizlar soni va ularning qiymatlari topilsin

n = 28; 28- Murakkab son(Primitive roat):

$28 = 2^2 * 7$

$\phi(\phi(28)) = \phi(28 * (1-1/2) * (1-1/7) = \phi(12)$

$12 = 2^2 * 3$

$\phi(12) = 12 * (1-1/2) * (1-1/3) = 4$;

4 – Birlamchi ildizlar soni;

Endi bu misol uchun tub guvohlikni topamiz:

$(2)^{28/2} * mod(28) = 4$;

$(3)^{28/2} * mod(28) = 9$;

$(5)^{28/2} * mod(28) = 25$;

$(7)^{28/2} * mod(28) = 21$;

$(11)^{28/2} * mod(28) = 9$;

$(13)^{28/2} * mod(28) = 1$;

6-amaliy ish:

20-variant

Eyler va Gamilton graflari va ularni SageMath instumentida amalga oshirish

Talabalarda SageMath dasturiy muhitidan foydalanib Gamilton va Eyler graflarini yaratish, vizuallashtirish hamda tekshirish bo‘yicha amaliy ko‘nikmalarni shakllantirishdan iborat.

1) **Berilgan graf Eyler grafiga aylanishi uchun unga eng kam nechta qirra qo‘shish kerak?**
   V = {A, B, C, D, E, F}
   E = {AB, AC, BD, CE, CF, DE, DF, FA}

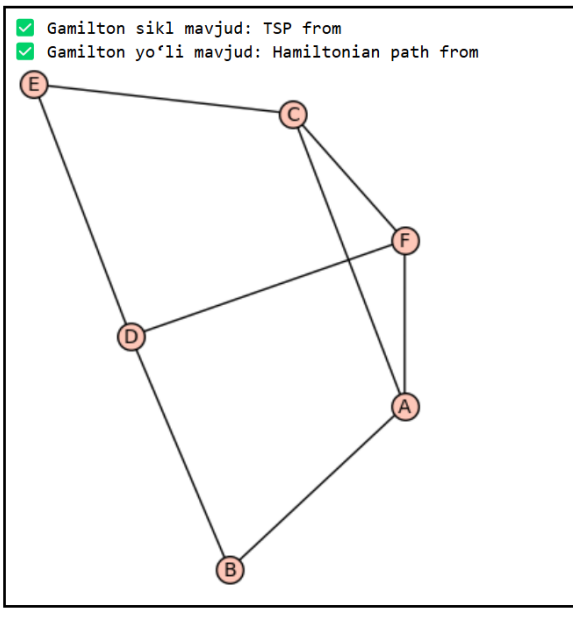
SageMath Cell

Type some Sage code below and press Evaluate.

```
# SageMath-da Gamilton siklni tekshirish
G = Graph()
# Tugunlar
V = ["A", "B", "C", "D", "E", "F"]
G.add_vertices(V)
# Qirralar
E = [("A", "B"), ("A", "C"), ("B", "D"), ("C", "E"), ("C", "F"),
     ("D", "E"), ("D", "F"), ("F", "A")]
G.add_edges(E)
# Gamilton siklni tekshirish (xatolikni oldini olish)
try:
```

Evaluate

Gamilton sikl mavjud: TSP from
Gamilton yo‘li mavjud: Hamiltonian path from



2) **Berilgan grafda Gamilton sikli va Gamilton yo‘li mavjudmi? Agar bo‘lmasa uni hosil qilish uchun eng kam nechta qirra qo‘shish kerakligi aniqlansin.**

V = {A, B, C, D, E, F, G, H, I, J, K, L, M, N}

E = {AB, BC, CD, DE, EF, FG, GH, HI, IJ, JK, KL, LM, MN, NA, BE}

SageMathCell

Type some Sage code below and press Evaluate.

```
import sage.all as sg
import matplotlib.pyplot as plt
# Grafikni yaratamiz
V = ["A", "B", "C", "D", "E", "F", "G", "H", "I", "J", "K", "L", "M", "N"]
E = [("A", "B"), ("B", "C"), ("C", "D"), ("D", "E"), ("E", "F"), ("F", "G"), ("G", "H"), ("H", "I"),
("I", "J"), ("J", "K"), ("K", "L"), ("L", "M"), ("M", "N"), ("N", "A"), ("B", "E")]
graph = sg.Graph()
graph.add_vertices(V)
graph.add_edges(E)
# Grafikni chizamiz
def draw_graph(G, title="Grafik"):
    G.plot(vertex_labels=True, edge_labels=False, layout="spring").show(title=title)
```

Evaluate