

RENESSANS TA'LIM UNIVERSITETI



Matematika va tabiiy fanlar kafedrası

G'.R.Beshimov

Iqtisodiyot (tarmoqlar va sohalar bo'yicha), Jahon iqtisodiyoti va xalqaro iqtisodiy munosabatlar (mintaqalar va faoliyat turlari bo'yicha), Soliq va soliqqa tortish (faoliyat turlari bo'yicha), Moliya va moliyaviy texnologiyalar, Bank ishi va auditi, Iqtisod Axborot tizimlari va texnologiyalari (tarmoqlar va sohalar bo'yicha) ta'lim yo'nalishlari 3-kurs talabalari uchun

EKONOMETRIKAGA KIRISH

fanidan mustaqil ishlar to'plami

Toshkent 2024

Ushbu uslubiy qo‘llanma talabalarning “Ekonometrikaga kirish” fanidan mustaqil ta’lim mashg‘ulotlarini olib borish uchun amaliy mazmundagi masalalar to‘plamidan tashkil topgan bo‘lib, “Ekonometrikaga kirish” fani davlat ta’lim standarti hamda o‘quv dasturiga to‘la mos keladi. Tavsiya etilayotgan amaliy topshiriqlar modullarga ajratilgan. Keltirilgan misol va mashqlar nazariy bilimlarni chuqurlashtirish, tatbiqini kengaytirishga qaratilgan bo‘lib, talabalarni mustaqil, ijodiy izlanishga yo‘naltiradi.

Tuzuvchi: Renessans ta’lim universiteti Matematika va tabiiy fanlar kafedrasida assistenti G‘.R.Beshimov.

Taqrizchilar:

UzMU Geometriya va topologiya kafedrasida professori, f.-m,f,d. R.B.Beshimov,
TDPU Umumiy matematika kafedrasida professori, f.-m,f,d. T.F.Jurayev

Uslubiy qo‘llanma Renessans ta’lim universiteti “Matematika va tabiiy fanlar” kafedrasining 2024 yil _____ №__ majlisida va universitet kengashining 2024 yil _____dagi №__ yig‘ilishida muhokama etilgan va chop etishga tavsiya qilingan.

KIRISH

Ushbu uslubiy qo'llanma barcha oliy ta'lim muassasalari "Iqtisodiyot (tarmoqlar va sohalar bo'yicha)", "Jahon iqtisodiyoti va xalqaro iqtisodiy munosabatlar (mintaqalar va faoliyat turlari bo'yicha)", "Soliq va soliqqa tortish (faoliyat turlari bo'yicha)", "Moliya va moliyaviy texnologiyalar", "Bank ishi va auditi", "Iqtisod Axborot tizimlari va texnologiyalari (tarmoqlar va sohalar bo'yicha)" ta'lim yo'nalishi talabalari uchun "Ekonometrikaga kirish" fanining dasturi asosida yozilgan.

Bugungi kunda barcha oliy ta'lim muassasalarida Kredit-modul tizimi asosida o'qitish joriy etilgan. Kredit-modul tizimiga ko'ra o'quv mashg'ulotlari shaxsga yo'naltirilgan o'qitish texnologiyalari va talabaning mustaqil o'qib o'rganishiga asoslanadi. Kredit-modul tizimida talabalar mustaqil ishining ikki turi ajratiladi:

- auditoriyada – bu bevosita o'qituvchi rahbarligida bajariladigan mustaqil ishlar;
- auditoriyadan tashqari – o'qituvchi tomonidan berilgan, lekin uni ishtirokisiz talaba tomonidan bajariladigan mustaqil ishlar.

Mustaqil ta'lim – ma'ruza va amaliy mashg'ulotlarda olgan bilim, ko'nikma, malakalarni mustahkamlash hamda fanga oid kompetensiyalarini rivojlantirish, mavzuga oid o'quv adabiyotlari ustida qo'shimcha mustaqil o'qish shakli.

Mustaqil ish – o'qituvchining topshirig'i va uning rahbarligida o'quv vazifasini hal etadigan ta'limning faol metodi. Fan xususiyatidan kelib chiqqan holda mustaqil ishda fan dasturida mustaqil o'zlashtirishi kerak bo'lgan mavzular ustida ishlash, individual vazifalarni bajarish, ularni himoya qilish ko'zda tutilgan.

Ushbu uslubiy qo'llanmada to'rtta modul bo'yicha mustaqil ta'lim topshiriqlari berilgan bo'lib, birinchi modulda tanlanma to'plamlarda statistik ko'rsatkichlarni hisoblash, ikkinchi modulda korrelyatsion tahlil, uchinchi modulda juft regression tenglama parametrlarini baholash, to'rtinchi modulda

ko'p omilli ekonometrik model parametrlarini baholash bo'yicha mustaqil topshiriq vazifalari berilgan.

1-modul. Tanlanmalar ustida amallar.

1-mustaqil ish.

1. Quyida berilgan tanlanmalarning variatsion qatori tuzilsin.
2. Tuzilgan variatsion qatorning variatsion taqsimoti, matematik kutilmasi, modasi, medianasi, arifmetik o'rtachasi, dispersiyasi va o'rtacha arifmetik chetlanishini toping.
3. Nisbiy chastota gistogrammasini chizing.
4. Variatsion qator uchun statistik taqsimot funksiyasini tuzing va grafigini yasang

1 - variant

[28, 33, 36, 31, 14, 20, 26, 27, 14, 26, 15, 26, 19, 34, 28, 13, 31, 34, 40, 27, 17, 32, 22, 38, 32, 31, 35, 33, 24, 16, 33, 35, 17, 33, 33, 22, 30, 28, 33, 20, 20, 14, 15, 30, 21, 38, 20, 30, 35, 37, 12, 40, 27, 23, 27, 21, 16, 19, 11, 18, 32, 29, 16, 40, 21, 37, 21, 16, 34, 29, 29, 33, 36, 38, 31, 20, 16, 25, 26, 37, 36, 35, 16, 11, 29, 38, 21, 36, 16, 14, 29, 39, 19, 18, 30, 32, 20, 13, 27, 22]

2 - variant

[16, 36, 23, 22, 12, 33, 14, 32, 12, 37, 39, 19, 38, 11, 16, 26, 27, 21, 18, 15, 13, 34, 31, 22, 33, 34, 30, 13, 33, 40, 15, 31, 32, 38, 13, 21, 19, 36, 39, 33, 33, 38, 26, 11, 40, 22, 38, 15, 26, 15, 37, 19, 27, 30, 17, 12, 22, 17, 16, 16, 16, 35, 35, 35, 19, 33, 36, 28, 38, 30, 24, 37, 25, 21, 34, 30, 16, 21, 32, 12, 35, 28, 39, 40, 39, 32, 37, 15, 38, 20, 17, 31, 38, 15, 32, 22, 29, 26, 37, 34]

3 - variant

[40, 16, 26, 34, 16, 31, 20, 38, 26, 35, 13, 24, 18, 38, 13, 19, 29, 13, 11, 39, 23, 36, 33, 26, 28, 34, 32, 19, 40, 28, 11, 22, 37, 30, 37, 36, 15, 39, 21, 20, 23, 31, 35, 16, 22, 16, 23, 14, 40, 26, 30, 23, 19, 30, 28, 18, 40, 12, 31, 11, 19, 35, 33, 24, 25, 14, 27, 37, 25, 31, 16, 24, 34, 35, 13, 20, 29, 15, 37, 39, 33, 13, 38, 40, 22, 31, 19, 22, 33, 18, 14, 33, 25, 33, 21, 17, 14, 27, 28, 13]

4 - variant

[33, 36, 35, 18, 38, 23, 20, 22, 30, 35, 18, 40, 17, 22, 27, 37, 39, 11, 17, 13, 18, 11, 39, 19, 36, 15, 34, 21, 39, 37, 17, 33, 12, 16, 30, 12, 40, 12, 26, 12, 39, 27, 22, 23, 25, 28, 16, 13, 28, 30, 18, 19, 12, 39, 39, 30, 31, 12, 25, 28, 27, 22, 23, 31, 19, 18, 35, 30, 22, 15, 38, 35, 36, 28, 12, 35, 20, 20, 16, 20, 16, 11, 25, 16, 40, 39, 19, 27, 36, 26, 22, 20, 36, 13, 17, 33, 12, 12, 38, 37]

5 - variant

[30, 27, 29, 23, 34, 32, 31, 27, 18, 32, 36, 31, 16, 11, 11, 14, 17, 26, 29, 15, 31, 15, 23, 32, 25, 34, 21, 34, 18, 16, 33, 18, 17, 31, 16, 15, 40, 17, 12, 31, 18, 20, 16, 36, 39, 27, 38, 39, 31, 34, 18, 11, 30, 30, 23, 16, 31, 40, 31, 16, 21, 25, 20, 31, 14, 27, 22, 14, 26, 13, 13, 22, 24, 34, 12, 25, 11, 34, 15, 20, 29, 23, 22, 18, 24, 39, 31, 19, 31, 20, 32, 18, 34, 14, 40, 36, 14, 23, 34, 19]

6 - variant

[29, 12, 19, 18, 34, 22, 40, 38, 26, 32, 29, 28, 37, 22, 29, 36, 19, 11, 28, 27, 20, 15, 16, 20, 40, 33, 30, 37, 14, 33, 11, 38, 30, 27, 30, 20, 39, 30, 29, 34, 40, 12, 37, 21, 37, 24, 40, 12, 12, 17, 22, 15, 39, 37, 15, 32, 27, 15, 18, 16, 23, 39, 33, 30, 31, 34, 11, 33, 13, 37, 38, 35, 40, 34, 37, 20, 31, 12, 24, 27, 23, 13, 19, 35, 31, 22, 11, 40, 20, 27, 11, 28, 15, 23, 39, 23, 31, 21, 35, 32]

7 - variant

[40, 35, 25, 21, 24, 39, 39, 39, 36, 16, 35, 32, 37, 19, 19, 40, 14, 26, 18, 33, 33, 33, 36, 11, 18, 16, 11, 12, 37, 20, 21, 25, 14, 37, 13, 29, 27, 25, 25, 23, 40, 37, 24, 25, 27, 23, 27, 22, 39, 31, 18, 18, 25, 24, 11, 15, 20, 11, 17, 13, 31, 36, 30, 20, 15, 40, 26, 36, 15, 38, 11, 36, 23, 40, 23, 13, 33, 14, 36, 34, 11, 40, 12, 11, 38, 33, 17, 16, 33, 12, 37, 12, 39, 37, 28, 13, 24, 38, 38, 31]

8 - variant

[12, 12, 15, 33, 38, 19, 20, 39, 17, 35, 11, 26, 19, 31, 40, 38, 29, 26, 32, 38, 36, 14, 22, 32, 29, 31, 34, 19, 38, 24, 18, 11, 38, 15, 19, 35, 40, 13, 17, 34, 13, 20, 36, 30, 13, 15, 21, 26, 27, 25, 13, 23, 37, 36, 18, 35, 24, 21, 24, 21, 31, 21, 21, 26, 27, 28, 33, 15, 17, 21, 20, 33, 25, 21, 33, 37, 19, 33, 15, 33, 38, 26, 34, 12, 21, 33, 23, 16, 31, 28, 19, 17, 14, 30, 40, 12, 16, 39, 23, 39]

9 - variant

[30, 17, 38, 22, 28, 36, 25, 27, 17, 24, 22, 25, 40, 36, 24, 33, 16, 14, 19, 30, 28, 37, 22, 35, 33, 13, 16, 12, 37, 33, 39, 39, 23, 36, 16, 20, 14, 25, 37, 36, 38, 17, 34, 26, 23, 31, 22, 27, 28, 21, 25, 12, 39, 16, 19, 28, 37, 12, 32, 26, 36, 26, 30, 27, 25, 36, 18, 35, 30, 24, 33, 20, 29, 28, 15, 25, 18, 35, 27, 24, 34, 25, 16, 32, 31, 20, 24, 23, 15, 12, 35, 12, 26, 18, 33, 13, 38, 39, 18, 38]

10 - variant

[40, 28, 28, 30, 25, 29, 37, 38, 28, 40, 20, 26, 39, 24, 14, 38, 27, 17, 31, 31, 29, 21, 31, 38, 37, 18, 39, 12, 14, 20, 21, 34, 38, 38, 37, 20, 16, 13, 26, 11, 36, 11, 15, 14, 22, 23, 30, 32, 35, 29, 38, 15, 18, 25, 27, 37, 35, 22, 18, 16, 12, 11, 30, 22, 32, 18, 16, 35, 31, 34, 30, 40, 15, 32, 36, 29, 25, 20, 22, 26, 11, 30, 35, 12, 33, 34, 28, 13, 31, 39, 32, 32, 15, 28, 21, 24, 33, 15, 16, 34]

11 - variant

[13, 36, 20, 20, 33, 26, 13, 21, 33, 13, 16, 33, 35, 35, 30, 25, 20, 13, 20, 38, 32, 24, 36, 32, 15, 23, 23, 18, 33, 23, 28, 38, 30, 30, 31, 19, 19, 20, 40, 22, 20, 18, 22, 21, 14, 18, 11, 29, 17, 22, 21, 22, 28, 15, 25, 36, 36, 30, 33, 26, 11, 25, 40, 24, 26, 17, 16, 33, 22, 12, 24, 11, 13, 38, 19, 29, 15, 34, 13, 12, 15, 30, 13, 24, 13, 39, 23, 13, 33, 24, 14, 21, 35, 31, 18, 40, 25, 34, 27, 34]

12 - variant

[38, 33, 17, 21, 13, 12, 12, 34, 26, 37, 33, 38, 31, 23, 25, 30, 35, 13, 40, 11, 40, 34, 16, 39, 22, 26, 38, 35, 26, 34, 30, 24, 24, 32, 20, 37, 32, 33, 21, 17, 31, 16, 22, 35, 39, 36, 40, 16, 32, 17, 13, 14, 30, 13, 33, 35, 27, 14, 21, 16, 16, 22, 36, 21, 19, 37, 34, 13, 18, 31, 23, 20, 18, 11, 27, 17, 35, 20, 27, 14, 18, 16, 11, 18, 37, 13, 29, 37, 31, 40, 33, 26, 18, 37, 19, 31, 28, 11, 40, 30]

13 - variant

[20, 21, 26, 36, 23, 30, 34, 23, 33, 33, 12, 32, 28, 15, 30, 24, 30, 11, 33, 18, 22, 24, 34, 12, 36, 28, 40, 20, 21, 11, 16, 33, 17, 12, 38, 15, 36, 25, 13, 21, 16, 27, 31, 20, 30, 12, 20, 32, 35, 39, 28, 19, 16, 38, 35, 17, 17, 39, 36, 11, 14, 20, 23, 16, 37, 22, 28, 18, 34, 25, 36, 26, 12, 16, 28, 20, 34, 15, 35, 12, 14, 18, 26, 24, 12, 34, 29, 30, 14, 35, 28, 25, 27, 39, 26, 19, 22, 15, 38, 34]

14 - variant

[35, 34, 18, 31, 13, 14, 39, 31, 21, 11, 37, 33, 38, 32, 24, 18, 26, 39, 34, 14, 30, 16, 22, 14, 27, 31, 39, 39, 16, 17, 40, 30, 29, 34, 30, 20, 11, 35, 36, 24, 29, 28, 21, 23, 22, 35, 12, 18, 29, 35, 19, 22, 16, 13, 28, 34, 23, 15, 13, 35, 21, 27, 26, 27, 11, 22, 40, 40, 39, 35, 26, 32, 31, 34, 15, 28, 36, 34, 18, 27, 36, 11, 31, 30, 34, 30, 32, 15, 33, 29, 15, 22, 28, 17, 36, 35, 19, 25, 38, 15]

15 - variant

[31, 23, 22, 27, 24, 29, 18, 32, 12, 28, 36, 15, 23, 24, 30, 38, 29, 39, 28, 24, 22, 25, 38, 33, 29, 28, 39, 33, 13, 36, 34, 35, 32, 22, 33, 26, 33, 35, 16, 20, 39, 18, 14, 16, 29, 11, 34, 28, 15, 37, 24, 22, 16, 35, 15, 39, 26, 18, 21, 32, 17, 11, 14, 35, 35, 32, 29, 24, 29, 14, 30, 36, 15, 33, 26, 40, 25, 11, 31, 22, 16, 13, 28, 22, 14, 23, 21, 18, 33, 23, 35, 20, 11, 15, 27, 11, 40, 40, 15, 23]

16 - variant

[17, 14, 20, 25, 18, 21, 33, 19, 23, 27, 37, 15, 16, 30, 35, 21, 11, 19, 31, 38, 38, 40, 19, 26, 39, 11, 23, 34, 32, 23, 40, 11, 37, 20, 34, 37, 25, 22, 28, 13, 12, 31, 19, 34, 27, 27, 13, 25, 24, 25, 18, 11, 15, 40, 23, 30, 15, 37, 14, 13, 12, 11, 34, 36, 19, 21, 34, 29, 33, 14, 37, 19, 25, 38, 32, 40, 34, 15, 21, 17, 25, 39, 19, 15, 16, 36, 39, 27, 19, 35, 34, 20, 30, 25, 18, 23, 23, 25, 12, 23]

17 - variant

[26, 35, 21, 35, 32, 19, 36, 39, 21, 31, 27, 27, 12, 32, 18, 40, 38, 33, 13, 28, 40, 14, 16, 23, 13, 16, 25, 13, 33, 37, 28, 15, 14, 39, 12, 34, 18, 37, 23, 20, 19, 11, 36, 28, 18, 28, 14, 35, 40, 23, 28, 38, 26, 19, 27, 31, 13, 36, 40, 33, 23, 32, 26, 22, 23, 15, 11, 37, 18, 12, 21, 17, 32, 21, 37, 21, 37, 22, 30, 33, 24, 11, 14, 12, 37, 18, 23, 34, 23, 15, 24, 37, 34, 24, 35, 40, 21, 29, 22, 18]

18 - variant

[37, 25, 18, 25, 15, 32, 21, 24, 20, 18, 14, 40, 35, 21, 23, 30, 21, 11, 18, 38, 25, 30, 12, 36, 32, 33, 37, 13, 23, 38, 23, 27, 14, 22, 27, 21, 18, 32, 25, 11, 27, 34, 40, 33, 22, 37, 31, 20, 14, 34, 14, 40, 24, 29, 38, 35, 25, 24, 19, 13, 22, 30, 16, 13, 14, 22, 28, 33, 40, 12, 22, 14, 20, 24, 39, 36, 12, 18, 28, 38, 20, 40, 13, 31, 33, 28, 16, 34, 23, 19, 30, 22, 36, 22, 15, 36, 29, 36, 27, 17]

19 - variant

[12, 27, 35, 16, 14, 40, 23, 35, 34, 31, 26, 35, 37, 35, 30, 23, 34, 26, 30, 26, 32, 29, 14, 22, 17, 22, 16, 27, 37, 35, 28, 39, 28, 24, 26, 16, 27, 15, 19, 17, 21, 29, 26, 33, 12, 38, 40, 13, 29, 26, 18, 33, 36, 26, 31, 15, 23, 36, 28, 25, 30, 28, 12, 13, 33, 20, 38, 32, 36, 13, 30, 18, 24, 18, 15, 13, 13, 37, 40, 21, 25, 40, 22, 38, 23, 25, 20, 28, 23, 34, 36, 16, 18, 29, 29, 21, 30, 12, 39, 17]

20 - variant

[14, 33, 22, 26, 40, 32, 17, 21, 26, 16, 34, 20, 20, 27, 30, 36, 30, 23, 19, 21, 16, 39, 35, 39, 16, 24, 18, 21, 31, 23, 39, 14, 23, 11, 27, 15, 11, 37, 19, 11, 33, 17, 18, 12, 19, 20, 25, 22, 18, 19, 15, 25, 23, 34, 16, 18, 29, 33, 32, 34, 23, 34, 14, 37, 37, 40, 23, 24, 12, 19, 23, 35, 17, 20, 25, 30, 22, 15, 21, 31, 31, 28, 21, 16, 30, 37, 14, 32, 40, 14, 37, 33, 19, 33, 28, 32, 22, 19, 22, 38]

21 - variant

[29, 19, 30, 35, 24, 33, 27, 27, 38, 35, 35, 16, 24, 27, 15, 14, 15, 24, 11, 35, 13, 29, 24, 15, 18, 26, 32, 14, 11, 30, 33, 28, 14, 34, 36, 13, 16, 19, 18, 16, 39, 24, 40, 30, 23, 21, 28, 19, 22, 22, 15, 32, 23, 20, 20, 37, 14, 32, 33, 31, 13, 26, 14, 40, 14, 35, 20, 17, 38, 23, 15, 27, 30, 17, 34, 13, 26, 23, 11, 19, 21, 28, 14, 15, 28, 15, 20, 21, 22, 24, 13, 27, 37, 38, 25, 34, 24, 40, 40, 21]

22 - variant

[24, 24, 33, 29, 24, 12, 27, 25, 28, 36, 29, 24, 20, 34, 27, 36, 12, 35, 20, 18, 19, 38, 39, 30, 13, 29, 29, 26, 13, 17, 26, 39, 19, 19, 25, 30, 39, 24, 12, 17, 32, 14, 14, 36, 22, 40, 15, 35, 31, 16, 17, 12, 35, 32, 31, 27, 32, 38, 26, 37, 26, 30, 17, 29, 32, 24, 32, 40, 26, 11, 39, 15, 14, 23, 13, 20, 25, 16, 40, 14, 13, 12, 30, 28, 34, 28, 40, 14, 19, 36, 33, 24, 38, 24, 37, 28, 25, 35, 28, 26]

23 - variant

[29, 13, 23, 29, 28, 26, 31, 15, 26, 24, 14, 21, 29, 17, 29, 17, 33, 13, 24, 23, 20, 18, 11, 35, 32, 36, 19, 15, 36, 35, 16, 40, 15, 26, 22, 25, 16, 17, 33, 33, 33, 29, 40, 12, 37, 36, 38, 34, 15, 30, 28, 23, 14, 26, 29, 40, 25, 18, 30, 12, 15, 25, 25, 40, 27, 30, 13, 39, 15, 23, 39, 37, 11, 31, 15, 13, 39, 16, 37, 34, 15, 39, 33, 21, 21, 11, 17, 25, 36, 16, 26, 21, 30, 36, 39, 29, 22, 26, 15, 11]

24 - variant

[19, 31, 33, 21, 27, 12, 27, 27, 23, 16, 30, 39, 13, 32, 21, 17, 13, 25, 37, 24, 21, 29, 11, 33, 32, 26, 39, 33, 17, 11, 26, 33, 21, 18, 30, 39, 33, 32, 20, 34, 15, 28, 38, 38, 25, 27, 25, 18, 32, 24, 15, 36, 14, 27, 11, 14, 15, 34, 35, 20, 40, 35, 12, 36, 31, 12, 37, 36, 13, 23, 29, 30, 38, 35, 40, 31, 19, 13, 31, 34, 34, 19, 34, 38, 31, 23, 21, 29, 18, 27, 11, 37, 26, 35, 31, 13, 28, 32, 23, 31]

25 - variant

[28, 29, 40, 38, 38, 33, 16, 19, 15, 34, 11, 39, 19, 18, 37, 20, 22, 32, 13, 21, 37, 19, 16, 16, 16, 40, 39, 35, 33, 31, 16, 37, 35, 40, 34, 40, 18, 21, 40, 26, 38, 18, 21, 36, 17, 30, 15, 32, 24, 24, 36, 23, 35, 15, 25, 26, 11, 31, 36, 39, 31, 12, 29, 14, 30, 37, 12, 26, 29, 34, 31, 17, 39, 36, 21, 24, 14, 30, 32, 30, 21, 16, 23, 39, 29, 37, 27, 40, 28, 29, 33, 17, 14, 31, 38, 33, 21, 21, 16, 32]

26 - variant

[29, 35, 16, 39, 29, 37, 35, 24, 34, 11, 17, 37, 25, 33, 17, 17, 37, 20, 16, 12, 40, 25, 26, 28, 12, 19, 33, 23, 26, 16, 18, 14, 27, 13, 36, 38, 26, 27, 20, 31, 18, 16, 15, 38, 18, 24, 30, 23, 35, 16, 11, 38, 38, 37, 31, 28, 25, 20, 17, 31, 24, 40, 14, 28, 40, 25, 40, 40, 38, 23, 13, 12, 38, 38, 30, 39, 27, 23, 38, 15, 36, 22, 32, 33, 36, 15, 12, 30, 12, 30, 24, 29, 29, 40, 26, 26, 21, 22, 23, 17]

27 - variant

[32, 30, 21, 32, 36, 23, 15, 38, 27, 16, 16, 37, 28, 29, 33, 25, 31, 19, 40, 25, 26, 26, 40, 29, 21, 40, 22, 22, 12, 37, 36, 30, 34, 23, 11, 14, 37, 17, 12, 28, 16, 27, 17, 14, 31, 34, 37, 14, 34, 11, 20, 38, 39, 15, 38, 32, 32, 26, 27, 11, 38, 38, 34, 28, 39, 11, 27, 31, 12, 27, 14, 22, 18, 15, 23, 12, 37, 24, 22, 28, 22, 24, 38, 22, 32, 23, 35, 33, 26, 36, 18, 37, 25, 21, 17, 14, 37, 22, 17, 29]

28 - variant

[22, 39, 19, 16, 32, 39, 17, 12, 15, 34, 32, 30, 19, 35, 12, 27, 40, 31, 18, 20, 23, 40, 14, 36, 11, 24, 29, 39, 31, 15, 26, 33, 23, 40, 14, 33, 16, 28, 33, 35, 37, 24, 40, 14, 27, 32, 13, 26, 22, 18, 21, 12, 31, 29, 39, 17, 18, 23, 37, 31, 36, 31, 28, 23, 37, 26, 34, 11, 38, 31, 19, 35, 12, 29, 35, 22, 40, 14, 36, 15, 32, 19, 38, 39, 32, 20, 23, 30, 38, 19, 30, 20, 26, 34, 12, 37, 13, 19, 34, 37]

29 - variant

[14, 35, 24, 16, 18, 24, 14, 33, 35, 28, 33, 40, 20, 28, 22, 21, 26, 40, 22, 33, 31, 18, 27, 35, 29, 12, 29, 21, 38, 33, 15, 35, 27, 22, 17, 33, 24, 28, 30, 38, 25, 12, 37, 35, 31, 31, 18, 33, 17, 39, 36, 21, 33, 13, 32, 21, 28, 32, 19, 32, 28, 40, 22, 27, 29, 25, 23, 38, 33, 19, 37, 24, 38, 40, 29, 11, 39, 32, 11, 32, 35, 33, 27, 35, 37, 11, 25, 12, 27, 11, 27, 26, 12, 30, 31, 21, 30, 23, 24, 36]

30 - variant

[18, 25, 15, 24, 18, 33, 37, 21, 22, 16, 37, 40, 18, 19, 31, 35, 31, 40, 38, 16, 37, 13, 13, 39, 33, 33, 23, 22, 26, 13, 32, 28, 40, 25, 18, 11, 28, 36, 17, 26, 20, 13, 21, 25, 20, 18, 37, 24, 16, 13, 17, 23, 40, 18, 36, 32, 26, 24, 12, 26, 15, 17, 15, 23, 22, 28, 34, 40, 20, 25, 36, 32, 12, 12, 13, 19, 29, 33, 13, 28, 27, 30, 36, 21, 27, 35, 28, 25, 19, 34, 39, 14, 18, 33, 11, 23, 29, 26, 13, 33]

31 - variant

[30, 28, 34, 12, 30, 33, 15, 15, 12, 30, 33, 21, 29, 19, 36, 18, 23, 40, 14, 20, 28, 21, 31, 15, 11, 32, 25, 34, 25, 17, 35, 17, 20, 14, 26, 27, 26, 37, 24, 24, 24, 17, 17, 15, 22, 24, 16, 23, 11, 30, 25, 27, 37, 21, 16, 33, 36, 12, 22, 39, 39, 22, 25, 13, 34, 36, 29, 27, 22, 30, 23, 32, 27, 32, 24, 36, 35, 23, 14, 32, 12, 20, 32, 16, 19, 17, 20, 40, 17, 27, 40, 15, 14, 37, 14, 29, 12, 17, 13, 16]

32 - variant

[24, 24, 27, 17, 27, 40, 12, 19, 26, 20, 22, 31, 21, 19, 15, 16, 15, 24, 27, 40, 33, 23, 34, 40, 27, 14, 33, 33, 13, 24, 11, 30, 28, 34, 11, 14, 25, 35, 18, 28, 32, 37, 15, 29, 18, 13, 23, 25, 25, 39, 35, 17, 24, 16, 16, 12, 34, 30, 12, 37, 11, 27, 12, 15, 28, 13, 21, 13, 16, 17, 36, 39, 15, 40, 38, 40, 33, 21, 27, 31, 36, 40, 21, 26, 28, 13, 35, 30, 39, 33, 18, 24, 28, 34, 20, 39, 31, 24, 39, 28]

33 - variant

[18, 24, 22, 27, 17, 29, 13, 19, 17, 14, 14, 14, 18, 38, 32, 39, 16, 33, 31, 34, 12, 36, 22, 17, 24, 13, 17, 40, 38, 21, 21, 39, 15, 25, 36, 39, 35, 13, 37, 11, 13, 21, 35, 33, 15, 29, 34, 38, 18, 33, 40, 36, 12, 21, 38, 24, 17, 37, 19, 12, 12, 32, 16, 27, 36, 20, 37, 29, 28, 37, 40, 15, 30, 14, 31, 25, 16, 25, 25, 19, 27, 40, 23, 12, 17, 25, 36, 15, 11, 29, 29, 37, 24, 11, 29, 15, 18, 11, 13, 32]

34 - variant

[23, 31, 22, 36, 36, 23, 23, 16, 15, 35, 26, 21, 32, 11, 33, 12, 35, 40, 34, 14, 25, 32, 34, 21, 18, 35, 18, 16, 12, 35, 22, 40, 26, 22, 30, 27, 33, 24, 37, 23, 13, 18, 35, 24, 27, 40, 32, 21, 26, 33, 17, 18, 36, 18, 36, 31, 24, 36, 27, 20, 21, 36, 11, 31, 22, 37, 25, 21, 14, 38, 30, 14, 30, 15, 26, 31, 21, 36, 14, 16, 32, 27, 13, 34, 21, 30, 23, 32, 23, 36, 12, 22, 40, 17, 38, 29, 22, 16, 29, 19]

35 - variant

[26, 36, 22, 16, 14, 36, 32, 11, 26, 26, 11, 35, 19, 31, 32, 40, 37, 22, 31, 39, 38, 36, 40, 25, 11, 25, 14, 34, 34, 39, 24, 29, 13, 17, 33, 13, 20, 35, 22, 18, 24, 20, 13, 38, 20, 16, 21, 28, 35, 29, 26, 35, 21, 33, 34, 37, 19, 40, 20, 18, 38, 29, 27, 32, 39, 13, 20, 34, 15, 25, 29, 22, 36, 39, 25, 37, 27, 19, 35, 19, 37, 15, 13, 16, 34, 33, 18, 13, 19, 18, 13, 32, 30, 19, 33, 16, 25, 35, 29, 13]

2-modul. Juft korrelyasion tahlil.

2-mustaqil ish.

Korrelyatsiya koeffitsentini hisoblang

1. Uy narxi va maydon

- Uy 1: 100 kv.m, narxi 80 000 dollar
- Uy 2: 150 kv.m, narxi 120 000 dollar
- Uy 3: 200 kv.m, narxi 160 000 dollar
- Uy 4: 250 kv.m, narxi 200 000 dollar

2. Talabaning o'qish soati va imtihon balli

- Talaba 1: 2 soat, 60 ball
- Talaba 2: 4 soat, 70 ball
- Talaba 3: 6 soat, 80 ball
- Talaba 4: 8 soat, 90 ball

3. Ish tajribasi va maosh

- Ishchi 1: 1 yil, 25 000 dollar
- Ishchi 2: 3 yil, 35 000 dollar
- Ishchi 3: 5 yil, 50 000 dollar
- Ishchi 4: 7 yil, 65 000 dollar

4. Mashina tezligi va yonilg'i sarfi

- Mashina 1: 40 km/soat, 8 litr/100 km
- Mashina 2: 60 km/soat, 7 litr/100 km
- Mashina 3: 80 km/soat, 6 litr/100 km
- Mashina 4: 100 km/soat, 5 litr/100 km

5. Qishloq xo'jalik hosildorligi va yer maydoni

- Maydon 1: 1 gektar, 20 tonna hosil
- Maydon 2: 2 gektar, 40 tonna hosil
- Maydon 3: 3 gektar, 60 tonna hosil
- Maydon 4: 4 gektar, 80 tonna hosil

6. Yog'ingarchilik miqdori va ekin hosildorligi

- Kuzatuv 1: 200 mm, 50 tonna
- Kuzatuv 2: 300 mm, 70 tonna
- Kuzatuv 3: 400 mm, 90 tonna
- Kuzatuv 4: 500 mm, 110 tonna

7. Oylik iste'mol va daromad

- Oila 1: 500 dollar, 1500 dollar daromad
- Oila 2: 700 dollar, 2000 dollar daromad
- Oila 3: 1000 dollar, 2500 dollar daromad
- Oila 4: 1200 dollar, 3000 dollar daromad

8. Yil fasli va elektr energiyasi sarfi

- Qish: 500 kVt
- Bahor: 300 kVt
- Yoz: 250 kVt
- Kuz: 400 kVt

9. Yozuv tezligi va yozma ishdagi xatolar soni

- Talaba 1: 10 so'z/min, 20 xato
- Talaba 2: 20 so'z/min, 15 xato
- Talaba 3: 30 so'z/min, 10 xato
- Talaba 4: 40 so'z/min, 5 xato

10. Sport mashg'ulot va vazn yo'qotish

- Sport 1: 30 daqiqa/kun, 2 kg yo‘qotish
- Sport 2: 1 soat/kun, 4 kg yo‘qotish
- Sport 3: 1,5 soat/kun, 6 kg yo‘qotish
- Sport 4: 2 soat/kun, 8 kg yo‘qotish

11. Kitob sahifalari soni va narxi

- Kitob 1: 100 sahifa, 10 dollar
- Kitob 2: 200 sahifa, 15 dollar
- Kitob 3: 300 sahifa, 20 dollar
- Kitob 4: 400 sahifa, 25 dollar

12. Kompyuter xotira hajmi va narxi

- Model 1: 4 GB, 300 dollar
- Model 2: 8 GB, 500 dollar
- Model 3: 16 GB, 800 dollar
- Model 4: 32 GB, 1200 dollar

13. O‘quvchi darsga tayyorgarlik vaqti va bahosi

- O‘quvchi 1: 1 soat, 60 ball
- O‘quvchi 2: 2 soat, 70 ball
- O‘quvchi 3: 3 soat, 85 ball
- O‘quvchi 4: 4 soat, 95 ball

14. Konditsioner quvvati va xona sovishi vaqti

- Konditsioner 1: 1 kVt, 30 daqiqa
- Konditsioner 2: 2 kVt, 20 daqiqa
- Konditsioner 3: 3 kVt, 15 daqiqa
- Konditsioner 4: 4 kVt, 10 daqiqa

15. Elektr tok kuchi va energiya iste‘moli

- $I = 2 \text{ A}$, $P = 400 \text{ W}$

- $I = 3 \text{ A}, P = 600 \text{ W}$
- $I = 4 \text{ A}, P = 800 \text{ W}$
- $I = 5 \text{ A}, P = 1000 \text{ W}$

16. Sayohat davomiyligi va masofa

- Sayohat 1: 2 soat, 100 km
- Sayohat 2: 3 soat, 150 km
- Sayohat 3: 4 soat, 200 km
- Sayohat 4: 5 soat, 250 km

17. Do‘kon soatlik mijozlar soni va daromad

- 20 mijoz, 100 dollar
- 40 mijoz, 200 dollar
- 60 mijoz, 300 dollar
- 80 mijoz, 400 dollar

18. Mobil telefon quvvati va ishlash vaqti

- Quvvat 20%, ishlash vaqti 2 soat
- Quvvat 40%, ishlash vaqti 4 soat
- Quvvat 60%, ishlash vaqti 6 soat
- Quvvat 80%, ishlash vaqti 8 soat

19. Internet tezligi va fayl yuklash vaqti

- Tezlik 5 MB/s, yuklash vaqti 40 daqiqa
- Tezlik 10 MB/s, yuklash vaqti 20 daqiqa
- Tezlik 20 MB/s, yuklash vaqti 10 daqiqa
- Tezlik 40 MB/s, yuklash vaqti 5 daqiqa

20. Mashina to‘xtash masofasi va tezlik

- Tezlik 20 km/soat, 5 metr

- Tezlik 40 km/soat, 10 metr
- Tezlik 60 km/soat, 20 metr
- Tezlik 80 km/soat, 35 metr

21. Iste'mol qilinadigan suv miqdori va uy narxi

- Uy 1: 1 m³ suv, 200 000 dollar
- Uy 2: 2 m³ suv, 220 000 dollar
- Uy 3: 3 m³ suv, 240 000 dollar
- Uy 4: 4 m³ suv, 260 000 dollar

22. Ishlash vaqti va ishlab chiqarilgan mahsulot miqdori

- Ishchi 1: 2 soat, 50 dona
- Ishchi 2: 4 soat, 100 dona
- Ishchi 3: 6 soat, 150 dona
- Ishchi 4: 8 soat, 200 dona

23. Ta'til kunlari va xarajatlar

- 1 kun: 200 dollar
- 2 kun: 400 dollar
- 3 kun: 600 dollar
- 4 kun: 800 dollar

24. Kiyim yuvish mashinasining sig'imi va narxi

- Mashina 1: 5 kg, 300 dollar
- Mashina 2: 7 kg, 400 dollar
- Mashina 3: 9 kg, 500 dollar
- Mashina 4: 11 kg, 600 dollar

25. Havо harorati va muzqaymoq sotuv hajmi

- 20°C, 100 dona
- 25°C, 200 dona

- 30°C, 300 dona
- 35°C, 400 dona

26. Elektr energiyasi iste'moli va elektr hisoblagich narxi

- Hisoblagich 1: 200 kVt, 50 dollar
- Hisoblagich 2: 400 kVt, 100 dollar
- Hisoblagich 3: 600 kVt, 150 dollar
- Hisoblagich 4: 800 kVt, 200 dollar

27. Ma'ruza soatlari va talabalar testdan o'tish foizi

- 1 soat: 50%
- 2 soat: 60%
- 3 soat: 75%
- 4 soat: 90%

28. Daraxt yoshiga qarab meva hosili

- 2 yil, 20 kg
- 4 yil, 50 kg
- 6 yil, 100 kg
- 8 yil, 150 kg

29. Televizor diagonali va narxi

- 32 dyuym, 300 dollar
- 40 dyuym, 400 dollar
- 50 dyuym, 500 dollar
- 60 dyuym, 600 dollar

30. Yoqilg'i narxi va sayohat narxi

- 1 litr: 1.5 dollar, sayohat narxi 100 dollar
- 1 litr: 2 dollar, sayohat narxi 120 dollar

- 1 litr: 2.5 dollar, sayohat narxi 140 dollar
- 1 litr: 3 dollar, sayohat narxi 160 dollar

31. Internetga ulanish narxi va tezlik

- 10 dollar, 10 Mbit/s
- 20 dollar, 20 Mbit/s
- 30 dollar, 30 Mbit/s
- 40 dollar, 40 Mbit/s

32. Tibbiy maslahatga keluvchilar va shifokor ishlash vaqti

- 2 bemor, 1 soat
- 4 bemor, 2 soat
- 6 bemor, 3 soat
- 8 bemor, 4 soat

33. Non ishlab chiqarish narxi va kilogramm narxi

- 10 kg, 30 dollar
- 20 kg, 60 dollar
- 30 kg, 90 dollar
- 40 kg, 120 dollar

34. Reklama va sotuv hajmi

- 100 dollar reklama, 500 dona sotuv
- 200 dollar reklama, 1000 dona sotuv
- 300 dollar reklama, 1500 dona sotuv
- 400 dollar reklama, 2000 dona sotuv

35. Ishlash vaqtiga qarab charchash indeksi

- 1 soat, 20%
- 2 soat, 40%
- 3 soat, 60%
- 4 soat, 80%

3 - modul. Juft regression bog'lanishlar.

3-mustaqil ish.

Chiziqli juft regressiya bog'lanishlarni topish

Quyida chiziqli juft regressiyaga mos keladigan bog'lanishlarning aniq misollar keltirilgan. Bu bog'lanishlarda ikkita o'zgaruvchi orasidagi munosabat to'g'ri chiziqli bo'lib, ularni regressiya tenglamasi $Y=a+bX$ shaklida ifodalash mumkin:

1. Talabaning darsga qatnashish foizi va yakuniy bahosi

- Talaba 1: 60% qatnashish, 65 ball
- Talaba 2: 70% qatnashish, 75 ball
- Talaba 3: 80% qatnashish, 85 ball
- Talaba 4: 90% qatnashish, 95 ball

Izoh: Bu yerda qatnashish foizi X, baho esa Y. To'g'ri chiziqli bog'lanish mavjud.

2. Uy maydoni va uning narxi

- Uy 1: 50 kv.m, 50 000 dollar
- Uy 2: 100 kv.m, 100 000 dollar
- Uy 3: 150 kv.m, 150 000 dollar
- Uy 4: 200 kv.m, 200 000 dollar

Izoh: Maydon X, narx Y o'zgaruvchilari orasida chiziqli munosabat mavjud.

3. Ish tajribasi va oylik maosh

- Ishchi 1: 1 yil, 1000 dollar
- Ishchi 2: 3 yil, 1500 dollar
- Ishchi 3: 5 yil, 2000 dollar
- Ishchi 4: 7 yil, 2500 dollar

Izoh: Tajriba X, maosh Y orasidagi bog'lanish to'g'ri chiziqli.

4. Televizor diagonal va narxi

- Model 1: 32 dyuym, 300 dollar
- Model 2: 40 dyuym, 400 dollar
- Model 3: 50 dyuym, 500 dollar
- Model 4: 60 dyuym, 600 dollar

Izoh: Diagonal X, narx Y orasidagi munosabat chiziqli.

5. Mashina tezligi va yoqilg'i sarfi

- Mashina 1: 40 km/soat, 8 litr/100 km
- Mashina 2: 60 km/soat, 6 litr/100 km
- Mashina 3: 80 km/soat, 4 litr/100 km
- Mashina 4: 100 km/soat, 2 litr/100 km

Izoh: Tezlik X, sarf Y. Bu yerda regressiya koeffitsienti manfiy (teskari bog'lanish).

6. Tadbirkor reklama xarajatlari va daromadi

- Reklama 1: 500 dollar, 10 000 dollar daromad
- Reklama 2: 1000 dollar, 20 000 dollar daromad
- Reklama 3: 1500 dollar, 30 000 dollar daromad
- Reklama 4: 2000 dollar, 40 000 dollar daromad

Izoh: Reklama xarajatlari X, daromad Y chiziqli bog'langan.

7. O'qish uchun ajratilgan soatlar va test natijalari

- Talaba 1: 1 soat, 50 ball
- Talaba 2: 2 soat, 60 ball
- Talaba 3: 3 soat, 70 ball
- Talaba 4: 4 soat, 80 ball

Izoh: O'qish soati X, natija Y.

8. Birja indeksi va kompaniya aksiyalari narxi

- Indeks 1: 2000, 20 dollar aksiyalar narxi
- Indeks 2: 2500, 25 dollar aksiyalar narxi
- Indeks 3: 3000, 30 dollar aksiyalar narxi
- Indeks 4: 3500, 35 dollar aksiyalar narxi

Izoh: Birja indeksi X, narx Y.

9. Yogʻingarchilik miqdori va hosildorlik

- Yil 1: 300 mm, 30 tonna
- Yil 2: 400 mm, 40 tonna
- Yil 3: 500 mm, 50 tonna
- Yil 4: 600 mm, 60 tonna

Izoh: Yogʻingarchilik X, hosil Y.

10. Ishchilar soni va ishlab chiqarilgan mahsulot miqdori

- Ishchi 1: 10 kishi, 100 dona
- Ishchi 2: 20 kishi, 200 dona
- Ishchi 3: 30 kishi, 300 dona
- Ishchi 4: 40 kishi, 400 dona

Izoh: Ishchilar soni X, mahsulot miqdori Y.

11. Elektr tok kuchi va elektr quvvati

- Tok kuchi 1: 2 A, quvvat 400 Vt
- Tok kuchi 2: 4 A, quvvat 800 Vt
- Tok kuchi 3: 6 A, quvvat 1200 Vt
- Tok kuchi 4: 8 A, quvvat 1600 Vt

Izoh: Tok kuchi X, quvvat Y.

12. Internet tezligi va yuklash vaqti

- Tezlik 1: 10 Mbit/s, 100 daqiqa
- Tezlik 2: 20 Mbit/s, 50 daqiqa
- Tezlik 3: 30 Mbit/s, 33 daqiqa

- Tezlik 4: 40 Mbit/s, 25 daqiqa

Izoh: Internet tezligi X, yuklash vaqti Y (teskari bog‘lanish).

13. Kundalik piyoda yurish masofasi va yoqilgan kaloriya

- Masofa 1: 1 km, 50 kaloriya
- Masofa 2: 2 km, 100 kaloriya
- Masofa 3: 3 km, 150 kaloriya
- Masofa 4: 4 km, 200 kaloriya

Izoh: Masofa X, yoqilgan kaloriya Y.

14. Dars tayyorgarlik vaqti va test natijasi

- Tayyorgarlik 1: 0.5 soat, 40 ball
- Tayyorgarlik 2: 1 soat, 60 ball
- Tayyorgarlik 3: 1.5 soat, 80 ball
- Tayyorgarlik 4: 2 soat, 100 ball

Izoh: Tayyorgarlik vaqti X, test natijasi Y.

15. Qurilish maydoni va material narxi

- Maydon 1: 50 m², 500 dollar
- Maydon 2: 100 m², 1000 dollar
- Maydon 3: 150 m², 1500 dollar
- Maydon 4: 200 m², 2000 dollar

Izoh: Qurilish maydoni X, material narxi Y.

16. Soatlik ish haqi va oylik daromad

- Ish haqi 1: 10 dollar, 1600 dollar
- Ish haqi 2: 12 dollar, 1920 dollar
- Ish haqi 3: 15 dollar, 2400 dollar
- Ish haqi 4: 20 dollar, 3200 dollar

Izoh: Ish haqi X, oylik daromad Y.

17. Mashina tezligi va to'xtash masofasi

- Tezlik 1: 20 km/soat, 5 metr
- Tezlik 2: 40 km/soat, 10 metr
- Tezlik 3: 60 km/soat, 15 metr
- Tezlik 4: 80 km/soat, 20 metr

Izoh: Tezlik X, to'xtash masofasi Y.

18. Issiqlik quvvati va suvning qaynash vaqti

- Quvvat 1: 1 kVt, 10 daqiqa
- Quvvat 2: 2 kVt, 5 daqiqa
- Quvvat 3: 3 kVt, 3.3 daqiqa
- Quvvat 4: 4 kVt, 2.5 daqiqa

Izoh: Issiqlik quvvati X, qaynash vaqti Y (teskari bog'lanish).

19. Xodimlar soni va loyihani tugatish vaqti

- Xodim 1: 2 kishi, 10 hafta
- Xodim 2: 4 kishi, 5 hafta
- Xodim 3: 6 kishi, 3.3 hafta
- Xodim 4: 8 kishi, 2.5 hafta

Izoh: Xodimlar soni X, vaqt Y (teskari bog'lanish).

20. Havo harorati va elektr energiyasi sarfi

- Harorat 1: 20°C, 300 kVt/soat
- Harorat 2: 25°C, 350 kVt/soat
- Harorat 3: 30°C, 400 kVt/soat
- Harorat 4: 35°C, 450 kVt/soat

Izoh: Harorat X, energiya sarfi Y.

21. Avtomobil yurgan masofa va yoqilg'i sarfi

- 100 km, 5 litr

- 200 km, 10 litr
- 300 km, 15 litr
- 400 km, 20 litr

Izoh: Masofa X, yoqilg'i sarfi Y.

22. Havo harorati va suv bug'lanishi miqdori

- 20°C, 5 litr
- 25°C, 10 litr
- 30°C, 15 litr
- 35°C, 20 litr

Izoh: Harorat X, bug'lanish Y.

23. Kitob sahifalari soni va o'qish davomiyligi

- 100 sahifa, 2 soat
- 200 sahifa, 4 soat
- 300 sahifa, 6 soat
- 400 sahifa, 8 soat

Izoh: Sahifalar soni X, o'qish vaqti Y.

24. Yer maydoni va hosil miqdori

- 1 gektar, 1 tonna
- 2 gektar, 2 tonna
- 3 gektar, 3 tonna
- 4 gektar, 4 tonna

Izoh: Yer maydoni X, hosil Y.

25. Qurilish brigadasi soni va qurilish muddati

- 1 brigada, 40 kun
- 2 brigada, 20 kun
- 3 brigada, 13 kun

- 4 brigada, 10 kun

Izoh: Brigada soni X, muddat Y (teskari bog‘lanish).

26. Elektr energiyasi quvvati va ishlash vaqti

- 100 Vt, 10 soat
- 200 Vt, 5 soat
- 300 Vt, 3.3 soat
- 400 Vt, 2.5 soat

Izoh: Quvvat X, ishlash vaqti Y (teskari bog‘lanish).

27. Kompyuter protsessori tezligi va ishlash samaradorligi

- 2 GHz, 200 bal
- 3 GHz, 300 bal
- 4 GHz, 400 bal
- 5 GHz, 500 bal

Izoh: Tezlik X, samaradorlik Y.

28. Mobil aloqa operatorining trafik narxi va miqdori

- 5 dollar, 10 GB
- 10 dollar, 20 GB
- 15 dollar, 30 GB
- 20 dollar, 40 GB

Izoh: Narx X, trafik Y.

29. Maosh miqdori va xarajatlar

- 1000 dollar, 800 dollar
- 1500 dollar, 1200 dollar
- 2000 dollar, 1600 dollar
- 2500 dollar, 2000 dollar

Izoh: Maosh X, xarajatlar Y.

30. Harakat tezligi va manzilga yetib borish vaqti

- 20 km/soat, 5 soat
- 40 km/soat, 2.5 soat
- 60 km/soat, 1.67 soat
- 80 km/soat, 1.25 soat

Izoh: Tezlik X, vaqt Y (teskari bogʻlanish).

31. Kompyuter xotira hajmi va ishlash tezligi

- 4 GB, 200 bal
- 8 GB, 400 bal
- 16 GB, 800 bal
- 32 GB, 1600 bal

Izoh: Xotira X, tezlik Y.

32. Dars oʻtkazish vaqti va talabalar oʻzlashtirishi

- 30 daqiqa, 40%
- 60 daqiqa, 60%
- 90 daqiqa, 80%
- 120 daqiqa, 100%

Izoh: Vaqt X, oʻzlashtirish Y.

33. Telefon akkumulyatori va ishlash vaqti

- 20%, 1 soat
- 40%, 2 soat
- 60%, 3 soat
- 80%, 4 soat

Izoh: Akkumulyator X, ishlash vaqti Y.

34. Ishlab chiqarilgan mahsulot miqdori va xarajatlar

- 100 dona, 500 dollar
- 200 dona, 1000 dollar
- 300 dona, 1500 dollar
- 400 dona, 2000 dollar

Izoh: Mahsulot X, xarajat Y.

35. Kiyim sotilishi va tushum miqdori

- 10 dona, 100 dollar
- 20 dona, 200 dollar
- 30 dona, 300 dollar
- 40 dona, 400 dollar

Izoh: Sotilish X, tushum Y.

4 - modul. Ko'p omilli ekonometrik model parametrlarini baholash.

4-mustaqil ish.

Ko'p omilli chiziqli ekonometrik bog'lanishlarni topish

1. Misol: Uy narxi prognozi (Maydon va Yoshi)

- **Bog'liq o'zgaruvchi (y):** Uy narxi (ming dollar)
- **Mustaqil o'zgaruvchilar (x1, x2):** Uy maydoni (kv.m.) va yoshi (yil)

Uy maydoni (x1)	Yoshi (x2)	Uy narxi (y)
120	10	250
150	8	300
170	5	320
130	12	260
160	6	310

2. Misol: Avtomobil narxi prognozi (Yoshi va Yoqilg'i sarfi)

- **Bog'liq o'zgaruvchi (y):** Avtomobil narxi (ming dollar)
- **Mustaqil o'zgaruvchilar (x1, x2):** Avtomobil yoshi (yil) va yoqilg'i sarfi (litr/100 km)

Yoshi (x1)	Yoqilg'i sarfi (x2)	Avtomobil narxi (y)
5	7	15
3	6	18
10	9	12
7	8	14
2	5	22

3. Misol: Kompyuter narxi prognozi (RAM va Protessor tezligi)

- **Bog'liq o'zgaruvchi (y):** Kompyuter narxi (ming dollar)

- **Mustaqil o'zgaruvchilar (x1, x2):** RAM (GB) va protsessor tezligi (GHz)

RAM (x1)	Protsessor tezligi (x2)	Kompyuter narxi (y)
8	2.5	10
16	3.0	12
4	2.0	7
32	3.5	15
16	3.2	13

4. Misol: Telefon narxi prognozi (Ekran o'lchami va xotira hajmi)

- **Bog'liq o'zgaruvchi (y):** Telefon narxi (ming dollar)
- **Mustaqil o'zgaruvchilar (x1, x2):** Ekran o'lchami (inchi) va xotira hajmi (GB)

Ekran o'lchami (x1)	Xotira hajmi (x2)	Telefon narxi (y)
6.1	64	10
6.5	128	15
5.8	32	8
6.0	64	12
6.2	128	14

5. Misol: Ijtimoiy tarmoqlarda reklama byudjeti va sotuvlar prognozi

- **Bog'liq o'zgaruvchi (y):** Sotuvlar (ming dollar)
- **Mustaqil o'zgaruvchilar (x1, x2):** Reklama byudjeti (ming dollar) va oylik foydalanuvchilar soni (ming)

Reklama byudjeti (x1)	Foydalanuvchilar soni (x2)	Sotuvlar (y)
5	100	30

Reklama byudjeti (x1)	Foydalanuvchilar soni (x2)	Sotuvlar (y)
8	150	50
6	120	40
10	200	70
7	130	45

6. Misol: Qishloq xo‘jaligi hosiliga ta’sir qiluvchi omillar (Daraxtlar soni va Sug‘orish vaqti)

- **Bog‘liq o‘zgaruvchi (y):** Hosil miqdori (tonna)
- **Mustaqil o‘zgaruvchilar (x1, x2):** Daraxtlar soni (ming dona) va sug‘orish vaqti (soat)

Daraxtlar soni (x1)	Sug‘orish vaqti (x2)	Hosil miqdori (y)
1000	10	50
1500	15	80
1200	12	60
1300	14	75
1100	13	70

7. Misol: Restoran daromadi va reklama byudjeti prognozi

- **Bog‘liq o‘zgaruvchi (y):** Restoran daromadi (ming dollar)
- **Mustaqil o‘zgaruvchilar (x1, x2):** Reklama byudjeti (ming dollar) va mijozlar soni (ming)

Reklama byudjeti (x1)	Mijozlar soni (x2)	Daromad (y)
5	100	15
8	150	22
6	120	18

Reklama byudjeti (x1)	Mijozlar soni (x2)	Daromad (y)
10	200	30
7	130	20

8. Misol: Sport zalining a'zolari soni va to'lov miqdori prognozi

- **Bog'liq o'zgaruvchi (y):** Sport zalining a'zolari soni (ming)
- **Mustaqil o'zgaruvchilar (x1, x2):** To'lov miqdori (dollar) va reklama kampaniyasi vaqti (hafta)

To'lov miqdori (x1)	Reklama vaqti (x2)	A'zolar soni (y)
50	4	10
60	5	12
55	4	11
70	6	15
65	5	13

9. Misol: Maktab o'quvchilari uchun dars natijalari prognozi

- **Bog'liq o'zgaruvchi (y):** Dars natijalari (ball)
- **Mustaqil o'zgaruvchilar (x1, x2):** O'qish vaqti (soat) va uy vazifalari bajarilishi (foiz)

O'qish vaqti (x1)	Uy vazifalari (x2)	Dars natijalari (y)
2	80	75
3	90	85
4	70	80
5	95	90
3	85	82

10. Misol: Avtomobil yoqilg'i sarfi va tezlik prognozi

- **Bog'liq o'zgaruvchi (y):** Yoqilg'i sarfi (litr/100 km)
- **Mustaqil o'zgaruvchilar (x1, x2):** Tezlik (km/soat) va avtomobil yoshi (yil)

Tezlik (x1)	Yoshi (x2)	Yoqilg'i sarfi (y)
60	3	7
70	5	8
80	4	9
90	6	10
100	2	6

11. Misol: Ta'lim darajasi va ish haqidagi prognoz

- **Bog'liq o'zgaruvchi (y):** Ish haqi (ming dollar)
- **Mustaqil o'zgaruvchilar (x1, x2):** Ta'lim darajasi (yil) va ish tajribasi (yil)

Ta'lim darajasi (x1)	Ish tajribasi (x2)	Ish haqi (y)
12	2	35
14	4	45
16	5	55
18	7	65
20	10	75

12. Misol: Turizm va ob-havo omillariga asoslangan prognoz

- **Bog'liq o'zgaruvchi (y):** Tashrif buyuruvchilar soni (ming)
- **Mustaqil o'zgaruvchilar (x1, x2):** Ob-havo harorati ($^{\circ}\text{C}$) va reklama xarajatlari (ming dollar)

Ob-havo harorati (x1)	Reklama xarajatlari (x2)	Tashrif buyuruvchilar soni (y)
22	5	10
25	8	15
28	10	20
30	12	25
20	6	12

13. Misol: Uchinchi sektorning iqtisodiy ko'rsatkichlari

- **Bog'liq o'zgaruvchi (y):** Yillik daromad (ming dollar)
- **Mustaqil o'zgaruvchilar (x1, x2):** Ishchilar soni (ming) va ishlab chiqarish xarajatlari (ming dollar)

Ishchilar soni (x1)	Ishlab chiqarish xarajatlari (x2)	Yillik daromad (y)
100	500	2000
120	600	2400
110	550	2200
130	650	2600
140	700	2800

14. Misol: Savdo do'koni daromadi prognozi (Oylik savdo va ijaraga xarajatlar)

- **Bog'liq o'zgaruvchi (y):** Savdo daromadi (ming dollar)
- **Mustaqil o'zgaruvchilar (x1, x2):** Oylik savdo (ming dona) va ijaraga xarajatlar (ming dollar)

Oylik savdo (x1)	Ijaraga xarajatlar (x2)	Savdo daromadi (y)
100	20	30

Oylik savdo (x1)	Ijaraga xarajatlar (x2)	Savdo daromadi (y)
120	25	35
150	30	40
200	35	50
130	28	38

15. Misol: Kafedagi foydalanuvchilar soni va ovqat narxi prognozi

- **Bog'liq o'zgaruvchi (y):** Kafedagi foydalanuvchilar soni (ming)
- **Mustaqil o'zgaruvchilar (x1, x2):** Ovqat narxi (dollar) va xizmat vaqti (soat)

Ovqat narxi (x1)	Xizmat vaqti (x2)	Foydalanuvchilar soni (y)
15	2	5
20	3	7
25	4	9
30	5	12
18	3	6

16. Misol: Internet trafik va reklama byudjeti prognozi

- **Bog'liq o'zgaruvchi (y):** Internet trafik (ming tashriflar)
- **Mustaqil o'zgaruvchilar (x1, x2):** Reklama byudjeti (ming dollar) va veb-saytning yangilanish tezligi (oyiga necha marta)

Reklama byudjeti (x1)	Yangilanish tezligi (x2)	Internet trafik (y)
5	2	20
8	3	30
6	2	25
10	4	40

Reklama byudjeti (x1)	Yangilanish tezligi (x2)	Internet trafik (y)
7	3	35

17. Misol: Ishchilar va ishlab chiqarish samaradorligi

- **Bog'liq o'zgaruvchi (y):** Ishlab chiqarish samaradorligi (yilda ishlab chiqarilgan mahsulot miqdori)
- **Mustaqil o'zgaruvchilar (x1, x2):** Ishchilar soni (kishi) va mashinalar soni (ta)

Ishchilar soni (x1)	Mashinalar soni (x2)	Samaradorlik (y)
50	10	5000
60	12	6000
70	14	7000
80	16	8000
90	18	9000

18. Misol: Kino mahsulotlarining daromadi (Budjet va yulduzlar soni)

- **Bog'liq o'zgaruvchi (y):** Kino mahsulotining daromadi (million dollar)
- **Mustaqil o'zgaruvchilar (x1, x2):** Kino budjeti (million dollar) va yulduzlar soni

Kino budjeti (x1)	Yulduzlar soni (x2)	Daromad (y)
50	3	120
60	4	150
70	5	170
80	6	200
90	7	250

19. Misol: Qurilish narxi prognozi (Xom ashyo narxi va Quruvchilar soni)

- **Bog'liq o'zgaruvchi (y):** Qurilish narxi (ming dollar)
- **Mustaqil o'zgaruvchilar (x1, x2):** Xom ashyo narxi (ming dollar) va quruvchilar soni

Xom ashyo narxi (x1)	Quruvchilar soni (x2)	Qurilish narxi (y)
100	10	300
120	12	350
150	14	400
180	16	450
130	11	320

20. Misol: O'quvchilar uchun test ballari prognozi (O'qish vaqti va qatnashish darajasi)

- **Bog'liq o'zgaruvchi (y):** Test ballari (ball)
- **Mustaqil o'zgaruvchilar (x1, x2):** O'qish vaqti (soat) va qatnashish darajasi (foiz)

O'qish vaqti (x1)	Qatnashish darajasi (x2)	Test ballari (y)
2	80	70
3	90	80
4	70	75
5	95	90
3	85	78

21. Misol: Internet savdosi va mahsulot turi prognozi

- **Bog'liq o'zgaruvchi (y):** Mahsulot sotilishi (ming dona)
- **Mustaqil o'zgaruvchilar (x1, x2):** Mahsulot narxi (dollar) va mahsulot turi (kategoriya raqami)

Mahsulot narxi (x1)	Mahsulot turi (x2)	Sotilish miqdori (y)
20	1	100
25	2	150
30	1	200
15	3	80
22	2	130

22. Misol: Avtomobil narxi va xususiyatlari prognozi

- **Bog'liq o'zgaruvchi (y):** Avtomobil narxi (ming dollar)
- **Mustaqil o'zgaruvchilar (x1, x2):** Yoshi (yil) va to'liq tankni quvvatlash narxi (dollar)

Yoshi (x1)	Tankni quvvatlash narxi (x2)	Avtomobil narxi (y)
2	30	25
4	40	20
6	50	18
3	35	22
5	45	19

23. Misol: Kafedagi mijozlar soni va xizmatlar prognozi

- **Bog'liq o'zgaruvchi (y):** Kafedagi mijozlar soni (ming)
- **Mustaqil o'zgaruvchilar (x1, x2):** Xizmat turi (soni) va oylik reklama byudjeti (ming dollar)

Xizmat turi (x1)	Reklama byudjeti (x2)	Mijozlar soni (y)
2	5	100
3	8	150
4	7	120

Xizmat turi (x1)	Reklama byudjeti (x2)	Mijozlar soni (y)
5	10	180
3	6	110

24. Misol: Kompyuter ishlab chiqarish va resurslar

- **Bog'liq o'zgaruvchi (y):** Ishlab chiqarish miqdori (kompyuterlar)
- **Mustaqil o'zgaruvchilar (x1, x2):** Ishchilar soni (ming) va resurslar narxi (ming dollar)

Ishchilar soni (x1)	Resurslar narxi (x2)	Ishlab chiqarish miqdori (y)
50	20	2000
60	25	2500
40	18	1800
70	30	3000
55	22	2200

25. Misol: Internet xizmatlarining narxi va sifatiga ta'sir

- **Bog'liq o'zgaruvchi (y):** Internet narxi (dollar/oy)
- **Mustaqil o'zgaruvchilar (x1, x2):** Yaqinlik (km) va xizmat ko'rsatish tezligi (Mbps)

Yaqinlik (x1)	Xizmat tezligi (x2)	Internet narxi (y)
2	100	50
4	200	70
6	150	60
3	180	65
5	250	80

26. Misol: Reklama va mahsulot sotuvlari prognozi

- **Bog'liq o'zgaruvchi (y):** Mahsulot sotuvlari (ming dona)
- **Mustaqil o'zgaruvchilar (x1, x2):** Reklama xarajatlari (ming dollar) va mahsulot sifatini baholash (ball)

Reklama xarajatlari (x1)	Mahsulot baholash (x2)	Sotuvlar (y)
10	80	200
12	90	250
15	85	280
8	75	180
20	95	300

27. Misol: Ishchilarning ish haqi va tajribasi

- **Bog'liq o'zgaruvchi (y):** Ish haqi (ming dollar)
- **Mustaqil o'zgaruvchilar (x1, x2):** Ish tajribasi (yil) va ta'lim darajasi (yil)

Ish tajribasi (x1)	Ta'lim darajasi (x2)	Ish haqi (y)
3	12	30
5	14	40
8	16	50
10	18	60
6	15	45

28. Misol: Internetda e'lon qilingan reklama va sotuvlar

- **Bog'liq o'zgaruvchi (y):** Sotuvlar (ming dollar)
- **Mustaqil o'zgaruvchilar (x1, x2):** Reklama narxi (ming dollar) va e'lonni ko'rgan odamlar soni (ming)

Reklama narxi (x1)	Odamlar soni (x2)	Sotuvlar (y)
5	20	10

Reklama narxi (x1)	Odamlar soni (x2)	Sotuvlar (y)
7	25	15
8	30	18
10	35	25
6	22	12

29. Misol: Energiya ishlab chiqarish va ijtimoiy omillar

- **Bog'liq o'zgaruvchi (y):** Energiya ishlab chiqarish miqdori (MWh)
- **Mustaqil o'zgaruvchilar (x1, x2):** Energiya manbalari soni (birlik) va ijtimoiy resurslar (ming dollar)

Energiya manbalari soni (x1)	Ijtimoiy resurslar (x2)	Ishlab chiqarish miqdori (y)
5	1000	2000
6	1200	2400
7	1100	2500
8	1300	2800
9	1400	3000

30. Misol: Mobil telefonlar narxi va texnik xususiyatlari

- **Bog'liq o'zgaruvchi (y):** Mobil telefon narxi (ming dollar)
- **Mustaqil o'zgaruvchilar (x1, x2):** Ekran o'lchami (inchi) va protsessor tezligi (GHz)

Ekran o'lchami (x1)	Protsessor tezligi (x2)	Telefon narxi (y)
5.5	2.0	10
6.0	2.5	12
6.5	3.0	15

Ekran o'lchami (x1)	Protssessor tezligi (x2)	Telefon narxi (y)
5.0	1.8	8
5.7	2.2	11

31. Misol: Onlayn kurslar va foydalanuvchi soni prognozi

- **Bog'liq o'zgaruvchi (y):** Foydalanuvchilar soni (ming)
- **Mustaqil o'zgaruvchilar (x1, x2):** Kurs davomiyligi (hafta) va reklama narxi (ming dollar)

Kurs davomiyligi (x1)	Reklama narxi (x2)	Foydalanuvchilar soni (y)
6	5	30
8	7	45
10	10	55
12	12	60
7	6	35

32. Misol: Boshqaruv xodimlarining ish haqi va tajribasi

- **Bog'liq o'zgaruvchi (y):** Boshqaruv xodimining ish haqi (ming dollar)
- **Mustaqil o'zgaruvchilar (x1, x2):** Yoshi (yil) va ta'lim darajasi (yil)

Yoshi (x1)	Ta'lim darajasi (x2)	Ish haqi (y)
35	15	80
40	18	90
45	20	100
50	22	110
38	17	85

33. Misol: Sport zalidagi a'zolar va qulayliklar

- **Bog'liq o'zgaruvchi (y):** Sport zalidagi a'zolar soni (ming)

- **Mustaqil o'zgaruvchilar (x_1, x_2):** Uskunalar turi (soni) va darslar soni (ta'lim)

Uskunalar turi (x_1)	Darslar soni (x_2)	A'zolar soni (y)
20	15	500
25	20	700
30	25	900
35	30	1100
22	18	600

34. Misol: Yaqinlardagi do'kon sotuvlari va ijtimoiy omillar

- **Bog'liq o'zgaruvchi (y):** Do'kon sotuvlari (ming dollar)
- **Mustaqil o'zgaruvchilar (x_1, x_2):** Mahsulot narxi (dollar) va mijozlar soni (ming)

Mahsulot narxi (x_1)	Mijozlar soni (x_2)	Sotuvlar (y)
10	200	250
12	220	280
15	250	320
18	300	350
14	210	270

35. Misol: Transport kompaniyasining kirimlari va logistika omillari

- **Bog'liq o'zgaruvchi (y):** Kompaniya kirimlari (ming dollar)
- **Mustaqil o'zgaruvchilar (x_1, x_2):** Yuki og'irligi (tonna) va transport harajatlari (ming dollar)

Yuki og'irligi (x_1)	Transport harajatlari (x_2)	Kirimlar (y)
50	20	300

Yuki og'irligi (x1)	Transport harajatlari (x2)	Kirimlar (y)
60	25	350
70	30	400
80	35	450
55	22	310

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