



Kattaqo‘rg‘on davlat pedagogika instituti Aniq va tabiiy fanlar fakulteti
4-bosqich Matematika yo‘nalishi talabalariga 8-semestr uchun
« Iqitsodiy masalalarni matematik yechish usullari »fanidan yakuniy nazorat savollari
Imtihon shakli: yozma-og‘zaki

№	Mavzu	1-QISM “NAZARIY SAVOLLAR 1”	2-QISM “NAZARIY SAVOLLAR 2”	3-QISM “AMALIY SAVOLLAR 1”	4-QISM “AMALIY SAVOLLAR 2”	5-qism “AMALIY SAVOLLAR 3”
1.	Amaliy va iqtisodiy masalalarning matematik modellari	Matematik programmalas hning predmeti nima	Matematik model haqida tushuntiring	Kichik korxona meva sharbatlarini chiqaradigan bo‘lsin. Korxonada 30 kg olcha, 45 kg olma, 12 kg shakar bor. Korxona ikki xil turdagi meva sharbatlarini chiqaradi. 1 – tur meva sharbatining bir bankasiga 0,1 kg olcha, 0,5 kg olma, 0,1 kg shakar solinsin. 2 – tur uchun bir bankasiga 0,3 kg olcha, 0,2 kg olma, 0,1 kg shakar solinsin. Agar 1 banka 1 – tur meva sharbati narxi 1000 so‘m, 2 – tur meva sharbati 1400 so‘m tursa, korxona har bir tur meva sharbatidan qanchadan ishlab chiqarganda korxonaning meva sharbatlarini sotishdan tushgan daromadi eng katta bo‘ladi?	Quyidagilardan foydalanib, $A = \begin{pmatrix} 4 & 1 \\ 3 & 1 \end{pmatrix}; B = \begin{pmatrix} 2 & 1 \\ 3 & 2 \end{pmatrix}; C = \begin{pmatrix} 2 & 5 \end{pmatrix}.$ Ishlab chiqarishni planlashtirish masalasini va uning matematik modelini tuzing.	Quyidagilardan foydalanib, Qishloq xo‘jaligi mollari uchun optimal ozuqa tayyorlash masalasi va uning matematik modelini tuzing. $A = \begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}; B = \begin{pmatrix} 3 & 1 \\ 2 & 2 \end{pmatrix}; C = \begin{pmatrix} 5 & 6 \end{pmatrix}.$

2.		Matematik programmalashtirishda yechimni qabul qilish qanday bosqichlardan iborat	Iqtisodiy-matematik modellarga ta'rif ayting	Kichik korxona meva sharbatlarini chiqaradigan bo'lsin. Korxonada 60 kg olcha, 85 kg olma, 13 kg shakar bor. Korxona ikki xil turdagi meva sharbatlarini chiqaradi. 1 – tur meva sharbatining bir bankasiga 0,3 kg olcha, 0,5 kg olma, 0,2 kg shakar solinsin. 2 – tur uchun bir bankasiga 0,6 kg olcha, 0,5 kg olma, 0,4 kg shakar solinsin. Agar 1 banka 1 – tur meva sharbat narxi 1200 so'm, 2 – tur meva sharbat 1800 so'm tursa, korxona har bir tur meva sharbatidan qanchadan ishlab chiqarganda korxonaning meva sharbatlarini sotishdan tushgan daromadi eng katta bo'ladi?	Quyidagilardan foydalanib, $A = \begin{pmatrix} 5 & 4 \\ 3 & 2 \end{pmatrix}; \quad B = \begin{pmatrix} 25 & 18 \\ 3 & 19 \end{pmatrix}; \quad C = \begin{pmatrix} 8 & 5 \end{pmatrix}.$ Ishlab chiqarishni planlashtirish masalasini va uning matematik modelini tuzing.	Quyidagilardan foydalanib, Qishloq $A = \begin{pmatrix} 2 & 3 \\ 3 & 2 \end{pmatrix}; \quad B = \begin{pmatrix} 10 & 20 \\ 3 & 15 \end{pmatrix}; \quad C = \begin{pmatrix} 3 & 8 \end{pmatrix}.$ xo'jalogi mollari uchun optimal ozuqa tayyorlash masalasi va uning matematik modelini tuzing.
3.	Chiziqli programmalash masalasida tengsizlikni tenglamaga aylantirish	Chiziqli programmalash masalasining kanonik ko'rinishi qanday	Tengsizlikni tenglamaga aylantirish teoremasini keltiring	Quyidagi masalalarni chiziqli programmalashning asosiy masalasiga keltiring: $\begin{cases} 18x_1 + 9x_2 \leq 720, \\ 8x_1 + 28x_2 \leq 56, \\ x_1 \geq 0, \quad x_2 \geq 0, \\ F = 11x_1 + 7x_2 \rightarrow \min. \end{cases}$	Quyidagi masalalarni chiziqli programmalashning asosiy masalasiga keltiring: $\begin{cases} 3x_1 + 4x_2 \leq 24, \\ 5x_1 + 4x_2 \geq 22, \\ 2x_1 + 7x_2 \geq 28, \\ x_1 \geq 0, \quad x_2 \geq 0, \\ F = 7x_1 + 4x_2 \rightarrow \min \end{cases}$	Ikkilangan simpleks usulda yechuvchi ustun va satr elementlarini hisoblang $\begin{cases} 5x_1 + 3x_2 \leq 52, \\ x_2 \leq 2, \\ 10x_1 + 4x_2 \leq 70, \\ x_1, x_2 \geq 0, \\ F = 8x_1 + 6x_2 \rightarrow \max. \end{cases}$

4.		Chiziqli programmalash masalasining optimal yechimining ta'rifini keltiring	Chiziqli programmalashtirish masalasining umumiy va kononik ko'rinishiga misol keltiring	Chiziqli programmalashning asosiy masalasiga keltiring: $\begin{cases} 7x_1 + 2x_2 \geq 14, \\ x_1 + 2x_2 \geq 10, \\ x_1 \geq 0, \quad x_2 \geq 0, \\ F = 3x_1 + 2x_2 \rightarrow \max \end{cases}$	Chiziqli programmalashning asosiy masalasiga keltiring: $\begin{cases} 2x_1 + x_2 \leq 6, \\ 6x_1 + 2x_2 \geq 1, \\ x_1 + 5x_2 \geq 4, \\ x_1 \geq 0, \quad x_2 \geq 0, \\ F = 2x_1 + 4x_2 \rightarrow \max. \end{cases}$	Ikkiilangan simpleks usulda yechuvchi ustun va satrdan farqli bo'lgan boshqa elementlarini hisoblang $\begin{cases} 5x_1 + 3x_2 \leq 52, \\ x_2 \leq 2, \\ 10x_1 + 4x_2 \leq 70, \\ x_1, x_2 \geq 0, \\ F = 8x_1 + 6x_2 \rightarrow \max. \end{cases}$
5.	Amaliy iqtisodiy masalaning geometrik va simpleks usullari.	Simpleks usuli deganda nimani tushunasiz	Simpleks usulda yechuvchi ustun qanday topiladi	Simpleks jadvalga joylashtiring: $\begin{cases} 7x_1 + 2x_2 \geq 14, \\ x_1 + 2x_2 \geq 10, \\ x_1 \geq 0, \quad x_2 \geq 0, \\ F = 3x_1 + 2x_2 \rightarrow \max \end{cases}$	Simpleks jadvalda indeks satri elementlarini toping $\begin{cases} 18x_1 + 9x_2 \leq 720, \\ 8x_1 + 28x_2 \leq 56, \\ x_1 \geq 0, \quad x_2 \geq 0, \\ F = 11x_1 + 7x_2 \rightarrow \min. \end{cases}$	Sun'iy basis usulda dastlabki tayanch plan tuzish uchun yechuvchi ustun elementlarini hisoblang $\begin{cases} x_1 + 3x_2 + 2x_3 + 2x_4 = 3, \\ 2x_1 + 2x_2 + x_3 + x_4 = 3, \\ x_j \geq 0, \quad j=1,2,3,4 \\ F = 5x_1 + 3x_2 + 4x_3 - x_4 \end{cases}$
6.		Simpleks usulining 1 va 2 teoremlarini keltiring	Sun'iy basis vektor usulida masala yechish tartibini ko'rsating	Simpleks jadvalda ifodalang $\begin{cases} 3x_1 + 4x_2 \leq 24, \\ 5x_1 + 4x_2 \geq 22, \\ 2x_1 + 7x_2 \geq 28, \\ x_1 \geq 0, \quad x_2 \geq 0, \\ F = 7x_1 + 4x_2 \rightarrow \min \end{cases}$	Sun'iy basis usulda simpleks jadvalda boshlang'ich planni tuzing $\begin{cases} x_1 + 3x_2 + 2x_3 + 2x_4 = 3, \\ 2x_1 + 2x_2 + x_3 + x_4 = 3, \\ x_j \geq 0, \quad j=1,2,3,4 \\ F = 5x_1 + 3x_2 + 4x_3 - x_4 \end{cases}$	Sun'iy basis usul yordamida dastlabki tayanch plandagi elementlarni hisoblang $\begin{cases} x_1 + 3x_2 + 2x_3 + 2x_4 = 3, \\ 2x_1 + 2x_2 + x_3 + x_4 = 3, \\ x_j \geq 0, \quad j=1,2,3,4 \\ F = 5x_1 + 3x_2 + 4x_3 - x_4 \end{cases}$
7.	Transport masalasini matematik	Transport masalasini potentsiallar	Transport masalasi haqida	Ushbu transport masalasini shimoliy-g'arbiy usulda	Quyidagi shartlar asosida transport masalasiga mos jadval hosil qiling	Samarqand viloyatining Jomboy va Juma bazasidan Kattaqo'rg'on, Ishtixon va Narpay tumanlariga bir

	modelini tuzish.	usuli bilan yechish	ma'lumot keltiring	yechilishi qanday bo'lishini tushuntiring $\begin{matrix} a_1 = 200, & b_2 = 130, \\ a_2 = 350, & b_3 = 100, \\ a_3 = 300, & b_4 = 190, \\ b_1 = 270, & b_5 = 110. \end{matrix} \quad T = \begin{pmatrix} 27 & 19 & 20 & 10 & 22 \\ 20 & 10 & 13 & 13 & 18 \\ 26 & 17 & 19 & 21 & 23 \end{pmatrix}$	$\begin{matrix} a_1 = 170, & b_2 = 110, \\ a_2 = 250, & b_3 = 160, \\ a_3 = 230, & b_4 = 90, \\ b_1 = 150, & b_5 = 140. \end{matrix} \quad T = \begin{pmatrix} 46 & 27 & 36 & 40 & 45 \\ 49 & 26 & 27 & 16 & 38 \\ 40 & 19 & 25 & 25 & 35 \end{pmatrix}$	jinsli tovarlarni tashish kerak. Tovarlar zaxirasi Jomboy bazasida 400 tonna, Juma bazasida esa 600 tonna. Kattaqo'rg'on tumanining tovarga ehtiyoji 350 tonna, Ishtixon tumaniniki 450 tonna va Narpay tumaniniki esa 200 tonna. Jomboy bazasidan uchta tumangacha bo'lgan masofalar, mos ravishda, 100 km, 60 km va 110 km. Juma bazasidan uchta tumangacha bo'lgan masofalar, mos ravishda, 40 km, 70 km va 50 km ga teng. Tumanlarga tovar tashishning optimal variantini topish ushuni masalaga mos jadval hosil qiling
8.		Transport masalasini yechishning taqsimot usuli	Transport masalasining matematik modelining ko'rinishlarini yozing	Minimal harajatlar usulida yeching $\begin{matrix} a_1 = 300, & b_2 = 150, \\ a_2 = 350, & b_3 = 190, \\ a_3 = 200, & b_4 = 150, \\ b_1 = 110, & b_5 = 250. \end{matrix} \quad T = \begin{pmatrix} 26 & 17 & 19 & 21 & 23 \\ 27 & 19 & 20 & 16 & 22 \\ 20 & 10 & 13 & 19 & 18 \end{pmatrix}$	Ushbu shartlar asosida tayanch reja tuzilsin $\begin{matrix} a_1 = 200, & b_2 = 130, \\ a_2 = 350, & b_3 = 100, \\ a_3 = 300, & b_4 = 190, \\ b_1 = 270, & b_5 = 110. \end{matrix} \quad T = \begin{pmatrix} 27 & 19 & 20 & 10 & 22 \\ 20 & 10 & 13 & 13 & 18 \\ 26 & 17 & 19 & 21 & 23 \end{pmatrix}$	Shimoliy-g'arb usulda hisoblang $\begin{matrix} a_1 = 170, & b_2 = 110, \\ a_2 = 250, & b_3 = 160, \\ a_3 = 230, & b_4 = 90, \\ b_1 = 150, & b_5 = 140. \end{matrix} \quad T = \begin{pmatrix} 46 & 27 & 36 & 40 & 45 \\ 49 & 26 & 27 & 16 & 38 \\ 40 & 19 & 25 & 25 & 35 \end{pmatrix}$
9.	Transport masalasining optimal yechimini topish usullari.	Transport masalasini jadval shaklini tuzing	Transport masalasining birinchi teoremasini yozing isboti bilan	Bir necha misollar yordamida transport masalasini yechishni planlarini yozing	$\begin{matrix} a_1 = 200, & b_2 = 110, \\ a_2 = 250, & b_3 = 100, \\ a_3 = 200, & b_4 = 120, \\ b_1 = 130, & b_5 = 190. \end{matrix} \quad T = \begin{pmatrix} 27 & 33 & 23 & 31 & 34 \\ 18 & 26 & 27 & 32 & 21 \\ 28 & 27 & 18 & 27 & 24 \end{pmatrix}$ a-mahsulot hajmi b-jo'natilishi zarur bo'lgan mahsulot hajmi shartlari berilgan bo'lsa transport masalasiga mos jadval yarating	$\begin{matrix} a_1 = 200, & b_2 = 110, \\ a_2 = 250, & b_3 = 100, \\ a_3 = 200, & b_4 = 120, \\ b_1 = 130, & b_5 = 190. \end{matrix} \quad T = \begin{pmatrix} 27 & 33 & 23 & 31 \\ 18 & 26 & 27 & 32 \\ 28 & 27 & 18 & 27 \end{pmatrix}$ a-mahsulot hajmi b-jo'natilishi zarur bo'lgan mahsulot hajmi shartlari berilgan bo'lsa transport masalasini shimoliy-g'arb usulida hisoblang

10.		Transport masalasini yechish usullari haqida nazariy ma'lumot bering	Transport masalasining 2,3,4 teoremlarini yozing	Minimal harajatlar usulini tushuntiring	Quyidagi transport masalasini minimal xarajalar usuli bilan ishlanishini tushuntiring $a_1 = 200, b_1 = 130,$ $a_2 = 350, b_2 = 100,$ $a_3 = 300, b_3 = 190,$ $b_4 = 270, b_5 = 110.$ $T = \begin{pmatrix} 27 & 19 & 20 & 10 & 22 \\ 20 & 10 & 13 & 13 & 18 \\ 26 & 17 & 19 & 21 & 23 \end{pmatrix}.$	Ushbu transport masalasini shimoliy-g'arbiy usulda yechilishi qanday bo'lishini tushuntiring $a_1 = 200, b_1 = 130,$ $a_2 = 350, b_2 = 100,$ $a_3 = 300, b_3 = 190,$ $b_4 = 270, b_5 = 110.$ $T = \begin{pmatrix} 27 & 19 & 20 & 10 & 22 \\ 20 & 10 & 13 & 13 & 18 \\ 26 & 17 & 19 & 21 & 23 \end{pmatrix}.$
11.	Butun sonli chiziqli iqtisodiy masalalarni yechishning Gomori usuli.	Butun sonli programmalash masalasini yechish uchun Gomori usuliga nazariy ma'lumotlar bering	Butun sonli programmalash masalasi deb nimaga aytiladi	Quyidagi shartlarda masalaning qisman butun sonli masala ekanini tushuntiring $\begin{cases} 3x_1 + x_2 \leq 9, \\ 0,16x_1 + x_2 \leq 1,9, \end{cases}$ $x_1 \geq 0, x_2 \geq 0$ va x_k butun sonlar ($k = 1; 2$). $f = x_1 + 8x_2 \rightarrow \max.$	Quyidagi shartlarda qisman butun sonli masalani yechishda dastlabki simpleks jadval tuzing $\begin{cases} 3x_1 + x_2 \leq 9, \\ 0,16x_1 + x_2 \leq 1,9, \end{cases}$ $x_1 \geq 0, x_2 \geq 0$ va x_k butun sonlar ($k = 1; 2$). $f = x_1 + 8x_2 \rightarrow \max.$	Quyidagi shartlarda qisman butun sonli masalani simpleks jadvaldagi kalit sonni toping $\begin{cases} 3x_1 + x_2 \leq 9, \\ 0,16x_1 + x_2 \leq 1,9, \end{cases}$ $x_1 \geq 0, x_2 \geq 0$ va x_k butun sonlar ($k = 1; 2$). $f = x_1 + 8x_2 \rightarrow \max.$
12.		To'liq va qisman butun sonli programmalash masalasi	Ishlab chiqarish va mahsulotni saqlashni optimallashtirish masalasi	Quyidagi shartlarda qisman butun sonli masalani simpleks jadvalda indekslar satrida manfiy son qolmagunicha ishlang $\begin{cases} 3x_1 + x_2 \leq 9, \\ 0,16x_1 + x_2 \leq 1,9, \end{cases}$ $x_1 \geq 0, x_2 \geq 0$ va x_k butun sonlar ($k = 1; 2$). $f = x_1 + 8x_2 \rightarrow \max.$	Quyidagi shartlarda masalaning qisman butun sonli masala ekanini tushuntiring $\begin{cases} 3x_1 + x_2 \leq 9, \\ 0,16x_1 + x_2 \leq 1,9, \end{cases}$ $x_1 \geq 0, x_2 \geq 0$ va x_k butun sonlar ($k = 1; 2$). $f = x_1 + 8x_2 \rightarrow \max.$	Quyidagi shartlarda qisman butun sonli masalaning simpleks jadvalidagi indekslar satri elementlarini hisoblang $\begin{cases} 3x_1 + x_2 \leq 9, \\ 0,16x_1 + x_2 \leq 1,9, \end{cases}$ $x_1 \geq 0, x_2 \geq 0$ va x_k butun sonlar ($k = 1; 2$). $f = x_1 + 8x_2 \rightarrow \max.$

13.	Parametrli chiziqli iqtisodiy masalalarni yechish usullari.	Parametrik programmalashtirish masalasida topilgan yangi yechim uchun teoremani izohlang	Parametrik programmalashning predmetini yozing	Parametrik masalada $\lambda_1 = \min_{\beta_j > 0} \left(\frac{-a_i}{\beta_j} \right)$ bo'lsa masalaning yechimi qaysi oraliqda bo'ladi	Agar $X^* = (x_{ij}^*)$ plan transport masalasining optimal plani bo'lsa, u holda unga $u_i^* + v_j^* = c_{ij}, \quad (x_{ij}^* > 0)$ $u_i^* + v_j^* \leq c_{ij}, \quad (x_{ij}^* = 0)$, shartlarni qanoatlantiruvchi $n + m$ ta u_i va v_j potentsiallar mos kelishini yetarligini keltiring	$\begin{cases} u_i^* + v_j^* = c_{ij}, & x_{ij}^* > 0, \\ u_i^* + v_j^* \leq c_{ij}, & x_{ij}^* = 0 \end{cases}$ ga asosan boshlang'ich plan optimal bo'lishi uchun qanday shartlar bajarilishi kerak
14.		Parametrning kritik qiymati va yechimi	Parametrik programmalash masalalari va maqsad funksiyasi parametriga bog'liq bo'lgan masala deb nimaga aytiladi	Agar i va j larning kamida bir qiymati uchun $\Delta_{ij} > 0$ bo'lsa, boshlang'ich tayanch plan qanday almashtiriladi	Agar $X = (x_1, \dots, x_m)$ tayanch plan uchun $y_j - c_j \leq 0, \quad (j = \overline{1, n})$ o'rinli bo'lsa, u plan optimal plan bo'lishini tekshiring	$\sum_{j=1}^n a_{ij} x_j = b_i + t b_i; (i = \overline{1, m}),$ $x_j \geq 0, \quad (j = \overline{1, n})$ $Y_{\min} = \sum_{j=1}^n c_j x_j$ Masaladagi σ ni chiziqli funksiya sifatida ifodalanishini tushuntiring
15.	Chiziqsiz programmalashtirish masalasini yechishda Lagranj usuli.	Chiziqsiz programmalash masalalarining geometrik talqining bosqichlarini keltiring	Funksiya Lagranj funksiyasi va Lagranj ko'paytuvchilarga misollar keltiring	nuqtalarni toping $F = x_1^2 + x_2^2, \quad x_1 + x_2 = 1$	Quyidagi $x_1 + x_2 = 7$ shartda $f(x_1, x_2) = (x_1 - 2)^2 + (x_2 - 3)^2$ funksiyaning $0 \leq x_1 \leq 5, \quad 0 \leq x_2 \leq 10$ sohadagi statsionar nuqtalar koordinatalarini toping	Quyidagi $\begin{cases} x_1 \cdot x_2 \geq 4, \\ x_1^2 + x_2^2 \leq 25, \\ x_1, x_2 \geq 0 \end{cases}$ $F(x_1, x_2) = 3x_1 + 4x_2$ shartlarni qanoatlantiruvchi chizma chizing

16.		Lagranjning ko'paytmalar usuli bilan ekstremal nuqtalarni topish hollarini keltiring	Masala yordamida lagranj usuluni tushuntirib bering	$x_1 + x_2 = 7$ shartda $f(x_1, x_2) = (x_1 - 2)^2 + (x_2 - 3)^2$ funksiyaning $0 \leq x_1 \leq 5, 0 \leq x_2 \leq 10$ sohadagi lagranj funksiyasini tuzing	Quyidagi $\begin{cases} x_1 \cdot x_2 \geq 4, \\ x_1^2 + x_2^2 \leq 25, \\ x_1, x_2 \geq 0 \end{cases}$ shartlarni qanoatlantiruvchi $F(x_1, x_2) = 3x_1 + 4x_2$ funksiyaning maksimum qiymatini topini jarayoni tushuntirib bering	Quyidagi $x_1 + x_2 = 7$ shartda $f(x_1, x_2) = (x_1 - 2)^2 + (x_2 - 3)^2$ funksiyaning $0 \leq x_1 \leq 5, 0 \leq x_2 \leq 10$ sohadagi shartli ekstremumini tekshiring
17.	Qavariq programmalashtirish. Kun-Takker teoremasi. Gradiyent usuli.	Qavariq to'plam. Qavariq funksiyalar.	Qavariq programmalash. Kun – Takker shartlari haqida ma'lumot bering	Quyidagi qavariq programmalashtirish masalasiga lagranj funksiyasini tuzing $\begin{cases} x_1 + x_2 \leq 7, \\ x_2 \leq 5, \\ x_1 \geq 0, x_2 \geq 0, \end{cases}$ $f(x_1, x_2) = x_1 + 8x_2 - x_1^2 -$	Quyidagi qavariq programmalashtirish masalasini logranj egarini $\begin{cases} x_1 + x_2 \leq 7, \\ x_2 \leq 5, \\ x_1 \geq 0, x_2 \geq 0, \end{cases}$ toping $f(x_1, x_2) = x_1 + 8x_2 - x_1^2 -$	Quyidagi qavariq programmalashtirish masalasiga Kun-Takker shartlarini tekshiring $\begin{cases} x_1 + x_2 \leq 7, \\ x_2 \leq 5, \\ x_1 \geq 0, x_2 \geq 0, \end{cases}$ $f(x_1, x_2) = x_1 + 8x_2 - x_1^2 - x_2^2 > \max.$
18.		Qavariq funksiyaning ekstremumini tushuntiring	Qavariq funksiyaning ekstrimumiga doir 1-teoremlarni keltiring	Quyidagi qavariq programmalashtirish masalasiga Kun-Takker shartlarini tekshiring $\begin{cases} x_1 + x_2 \leq 7, \\ x_2 \leq 5, \\ x_1 \geq 0, x_2 \geq 0, \end{cases}$ $f(x_1, x_2) = x_1 + 8x_2 - x_1^2 -$	Quyidagi $\begin{cases} x_1 \cdot x_2 \geq 4, \\ x_1^2 + x_2^2 \leq 25, \\ x_1, x_2 \geq 0 \end{cases}$ $F(x_1, x_2) = 3x_1 + 4x_2$ shartlarni qanoatlantiruvchi chizma chizing	Quyidagi qavariq programmalashtirish masalasiga lagranj funksiyasini tuzing $\begin{cases} x_1 + x_2 \leq 7, \\ x_2 \leq 5, \\ x_1 \geq 0, x_2 \geq 0, \end{cases}$ $f(x_1, x_2) = x_1 + 8x_2 - x_1^2 - x_2^2 > \max.$
19.	Dinamik programmalas	Dinamik programmalas	Dinamik programmalash	yt: 30 35 39 40 44	yt: 11 13 14 15 12 10	yt: 30 35 39 40 44 50 53

	h masalasining umumiy qo'yilishi.	h vaqtga bog'liq bo'lmagan yana qanday masalalar ishlashda qo'llaniladi	masalasining umumiy qo'yilishi misollar orqali tushuntiring	Yuqoridagi vaqtli qatorning 1-tartibli avtokorrelyatsiyasini toping.	Yuqoridagi vaqtli qatorning 1-tartibli avtokorrelyatsiyasini toping.	Yuqoridagi vaqtli qatorning 2-tartibli avtokorrelyatsiyasini toping.
20.		Dinamik programmalashning xususiyatlarini yozing	Dinamik programmalash usulida iqtisodiy masalalar ishlashni tushuntiring	y _t : 6 7 8 10 7 Yuqoridagi vaqtli qatorning 1-tartibli avtokorrelyatsiyasini toping.	y _t : 14 15 13 14 15 15 Yuqoridagi vaqtli qatorning 1-tartibli avtokorrelyatsiyasini toping.	y _t : 11 13 14 15 12 10 13 Yuqoridagi vaqtli qatorning 2-tartibli avtokorrelyatsiyasini toping.
21.	Dinamik programmalashning funksional tenglamalari.	Dinamik programmalash tirishda strategiya nima	Dinamik programmalash vaqtga bog'liq bo'lmagan yana qanday masalalar ishlashda qo'llaniladi	y _t : 14 15 13 14 15 Yuqoridagi vaqtli qatorning 1-tartibli avtokorrelyatsiyasini toping.	y _t : 7 8 9 10 8 11 7 Yuqoridagi vaqtli qatorning 1-tartibli avtokorrelyatsiyasini toping.	y _t : 25 30 35 40 44 51 54 Yuqoridagi vaqtli qatorning 2-tartibli avtokorrelyatsiyasini toping.
22.		Dinamik programmalashning funksional tenglamalari	Dinamik programmalash usulida iqtisodiy masalalar ishlashni tushuntiring	y _t : 2 3 5 10 8 Yuqoridagi vaqtli qatorning 1-tartibli avtokorrelyatsiyasini toping.	y _t : 30 35 39 40 44 50 Yuqoridagi vaqtli qatorning 2-tartibli avtokorrelyatsiyasini toping.	y _t : 30 35 39 40 44 50 53 Yuqoridagi vaqtli qatorning 2-tartibli avtokorrelyatsiyasini toping.