



Samarqand davlat universitetning Kattaqo'rg'on filiali Aniq va tabiiy fanlar fakulteti Matematika ta'lim yo'nalishi
4-kurs talabalariga « Variatsion hisob va optimallashtirish usullari » fanidan yakuniy nazorat savollari

Imtihon shakli: amaliy

Savolning tartib raqami	Savolning qiyinlik darajasi	Savolning qanday mashg'ulotga tegishliligi	Mavzu nomeri	Savol matni
1.	1	A	1	$J[y] = \int_1^2 (y'^2 + 4xy) dx \rightarrow extr$ $y(1) = 0, \quad y(2) = -1$ Yuqoridagi masala uchun Eyler tenglamasini tuzing va maple paketidan foydalanib differensial tenglamani yeching.
2.	1	A	2	$J[y] = \int_1^{2\pi} (y'^2 - y^2) dx \rightarrow extr$ $y(0) = 1, \quad y(2\pi) = 1$ Keltirilgan masala uchun Eyler tenglamasini tuzing va maple paketidan foydalanib differensial tenglamani yeching.

3.	1	A	2	$\left. \begin{aligned} J[y] &= \int_1^3 (3x - y)y dx \rightarrow \text{extr} \\ y(1) &= 1, \quad y(3) = 4. \end{aligned} \right\}$	Keltirilgan masala uchun Eyler tenglamasini tuzing.
4.	1	A	2	$\left. \begin{aligned} J[y] &= \int_1^3 (3x - y)y dx \rightarrow \text{extr} \\ y(1) &= 1, \quad y(3) = 4. \end{aligned} \right\}$	Keltirilgan masala uchun joiz statsionar funksiyasini aniqlang.
5.	3	A	2	$\left. \begin{aligned} J[y] &= \int_1^{2\pi} (y'^2 - y^2) dx \rightarrow \text{extr} \\ y(0) &= 1, \quad y(2\pi) = 1 \end{aligned} \right\}$	Keltirilgan masala uchun joiz statsionar funksiyasini aniqlang.
6.	1	A	2	$\left. \begin{aligned} J[y] &= \int_1^2 (y'^2 + 4xy) dx \rightarrow \text{extr} \\ y(1) &= 0, \quad y(2) = -1 \end{aligned} \right\}$	Keltirilgan masala uchun joiz statsionar funksiyasini aniqlang va maple paketidan foydalanib tenglamani yeching.
7.	2	A	2	$J(y) = \int_0^2 (y'^2 - yy' + 9y^2) dx \rightarrow \min, \quad y(0) = 0, y(2) = 1, y \in C^{(1)}[0;2]$	variatsion hisob asosiy masalasida Eyler tenglamasini tuzing.
8.	3	A	2	$J(y) = \int_{-1}^1 (y'^2 - 9y^2 + 2yx^2) dx \rightarrow \min; \quad y(-1) = 0, y(1) = 1, y \in C^{(1)}[-1;1]$	variatsion hisob asosiy masalasida Eyler tenglamasini tuzing va maple paketidan foydalanib differensial tenglamani yeching.
9.	1	A	2	$J(y) = \int_0^1 (y'^3 - 5ye^x) dx \rightarrow \min; \quad y(0) = 0, y(1) = 1, y \in C^{(1)}[0;1]$	variatsion hisob asosiy masalasida Eyler tenglamasini tuzing.
10.	1	A	2	$J(y) = \int_0^2 (y'^2 + 3yy' + 4y^2) dx \rightarrow \min, \quad y(0) = 0, y(2) = 1, y \in C^{(1)}[0;2]$	

				variatsion hisob asosiy masalasida Eyler tenglamasini tuzing va differensial tenglamani Maple paketida yechish.
11.	1	A	2	$J(y) = \int_{-1}^1 (y'^2 - y^2 + 6yx^3) dx \rightarrow \min; y(-1) = 0, y(1) = 1, y \in C^{(1)}[-1;1]$ variatsion hisob asosiy masalasini Maple paketidan foydalanib yeching.
12.	2	A	3	$J(y) = \int_0^1 (y'^3 - ye^{2x}) dx \rightarrow \min; y(0) = 0, y(1) = 1, y \in C^{(1)}[0;1]$ variatsion hisob asosiy masalasida Eyler tenglamasini Maple paketidan foydalanib tuzing.
13.	2	A	3	$J(y) = \int_0^2 (4y'^2 + 5yy' - y^2) dx \rightarrow \min, y(0) = 0, y(2) = 1, y \in C^{(1)}[0;2]$ variatsion hisob asosiy masalasini Maple paketidan foydalanib yeching.
14.	1	A	3	$J(y) = \int_0^2 (y'^2 - 2yy' - 4y^2) dx \rightarrow \min, y(0) = 0, y(2) = 1, y \in C^{(1)}[0;2]$ variatsion hisob asosiy masalasini Maple paketidan foydalanib yeching.
15.	1	A	4	$J(y) = \int_{-1}^1 (y'^2 + 2y^2 + 3yx^3) dx \rightarrow \min; y(-1) = 0, y(1) = 1, y \in C^{(1)}[-1;1]$ variatsion hisob asosiy masalasini Maple paketidan foydalanib yeching.
16.	2	A	4	$J(y) = \int_{\frac{\pi}{2}}^{\pi} (y'^2 - 4y' \sin 2x) dx \rightarrow \min; y(\frac{\pi}{2}) = 1, y(\pi) = 0, y \in C^{(1)}[\frac{\pi}{2}; \pi]$ variatsion hisob asosiy masalasida Eyler tenglamasini Maple paketidan foydalanib tuzing.
17.	1	A	4	$J(y) = \int_0^2 (y'^2 - 8xyy') dx \rightarrow \min; y(0) = 0, y(2) = 1, y \in C^{(1)}[0;2]$ variatsion hisob asosiy masalasida joiz statsionar funksiyani toping va garfigini chizing.
18.	1	A	5	$J(y) = \int_0^{\pi} (y'^2 + 2y' \cos x) dx \rightarrow \min; y(0) = 1, y(\pi) = 0, y \in C^{(1)}[0; \pi]$ variatsion hisob asosiy masalasida joiz statsionar funksiyani Maple paketidan foydalanib tuzing.

19.	2	A	5	$J(y) = \int_0^1 (y'^2 + 12xy) dx \rightarrow \min; y(0) = 0, y(1) = 2, y \in C^{(1)}[0;1]$ variatsion hisob asosiy masalasida joiz statsionar funksiyasini Maple paketidan foydalanib tuzing va garfigini chizing.
20.	3	A	5	$J(y) = \int_0^{\frac{\pi}{\sqrt{2}}} (y'^2 + 4xyy') dx \rightarrow \min; y(0) = 0, y(\frac{\pi}{\sqrt{2}}) = 1, y \in C^{(1)}[0; \frac{\pi}{\sqrt{2}}]$ variatsion hisob asosiy masalasida joiz statsionar funksiyasini Maple paketidan foydalanib tuzing va garfigini chizing.
21.	1	A	5	$J(y) = \int_0^2 (y'^2 - yy' + 9y^2) dx \rightarrow \min, y(0) = 0, y(2) = 1, y \in C^{(1)}[0;2]$ variatsion hisob asosiy masalasini Eyler tenglamalarni hususiy hollarini qo'llab Maple paketidan foydalanib tuzing va garfigini chizing.
22.	3	A		$J(y) = \int_0^2 (4y'^2 + 5yy' - y^2) dx \rightarrow \min, y(0) = 0, y(2) = 1, y \in C^{(1)}[0;2]$ variatsion hisob asosiy masalasini Eyler tenglamalarni hususiy hollarini qo'llab Maple paketidan foydalanib tuzing va garfigini chizing.
23.	1	A	6	$J(y) = \int_0^2 (y'^2 - 3yy' + 8y^2) dx \rightarrow \min, y(0) = 0, y(2) = 1, y \in C^{(1)}[0;2]$ variatsion hisob asosiy masalasini Eyler tenglamalarni hususiy hollarini qo'llab Maple paketidan foydalanib tuzing va garfigini chizing.
24.	2	A	7	$J(y) = \int_{-1}^1 (y'^3 + 5xyy' - x^2y) dx$ Maple paketida foydalanib funksionalning ikkinchi variatsiyasini hisoblang.
25.	1	A	7	$J(y) = \int_0^3 (y'^2 - 2y'x) dx \rightarrow \min; y(0) = 0, y(3) = 1, y \in C^{(1)}[0;3]$ masalaning joiz statsionar funksiyasida Lejandr shartining bajarilishini Maple paketida foydalanib ko'rsating.

26.	2	A	7	$J(y) = \int_0^1 (y'^2 + 9y^2 + y'e^{4x})dx \rightarrow \min; y(0) = 0, y(1) = 1, y \in C^{(1)}[0;1]$ masalada $y^0(x) = x$ joiz funksiyalar bo'ylab Yakobi tenglamasini tuzing.
27.	2	A	7	$J(y) = \int_0^1 (y'^2 + 4y^2 - 3y'x^2)dx \rightarrow \min(\max), y(0) = 0, y(1) = 1$ masalada kuchsiz lokal ekstremalni toping.
28.	2	A	7	$J(y) = \int_0^1 (y'^2 + 3y^2 - y'(y + x^2))dx$ Maple paketida foydalanib funksionalning ikkinchi variatsiyasini hisoblang.
29.	2	A	7	$J(y) = \int_{-1}^1 (y'^3 - 6xyy')dx$ Maple paketida foydalanib funksionalning ikkinchi variatsiyasini hisoblang.
30.	2	A	7	$J(y) = \int_{\pi}^{2\pi} (y'^2 - 5y(y' - 2y \sin 2x))dx$ Maple paketida foydalanib funksionalning ikkinchi variatsiyasini hisoblang.
31.	2	A	8	$J(y) = \int_1^3 (y'^2 - 3y' \cos x)dx \rightarrow \min; y(1) = 0, y(3) = 1, y \in C^{(1)}[1;3]$ variatsion masalaning kuchsiz lokal ekstremalida Lejandr shartining bajarilishini ko'rsating.
32.	2	A	8	$J(y) = \int_0^1 (y'^2 - 7xy)dx \rightarrow \min; y(0) = 0, y(1) = 2, y \in C^{(1)}[0;1]$ variatsion masalaning kuchsiz lokal ekstremalida Lejandr shartining bajarilishini ko'rsating.
33.	1	A	8	$J(y) = \int_0^2 (y'^2 + 5yy')dx \rightarrow \min; y(0) = 0, y(2) = 1, y \in C^{(1)}[0;2]$ variatsion masalaning kuchsiz lokal ekstremalida Lejandr shartining bajarilishini ko'rsating.
34.	1	A	8	$J(y) = \int_1^3 (y'^2 + y' \cos x + y)dx \rightarrow \min; y(1) = 0, y(3) = 1, y \in C^{(1)}[1;3]$ variatsion masalaning kuchsiz lokal ekstremalida Lejandr shartining bajarilishini ko'rsating.

35.	2	A	8	$J(y) = \int_{\pi}^{2\pi} (y'^2 + 9y^2 + 3y'(y + \sin x)) dx \rightarrow \min, y(\pi) = -1, y(2\pi) = 0, y \in C^{(1)}[\pi; 2\pi]$ variatsion masalaning $y^0(x) = x$ joiz funksiyalar bo'ylab Yakobi tenglamasini Maple paketidan foydalanib tuzing.
36.	3	A	8	$J(y) = \int_{\pi}^{2\pi} (y'^2 + 9y^2 + 3y'(y + \sin x)) dx \rightarrow \min, y(\pi) = -1, y(2\pi) = 0, y \in C^{(1)}[\pi; 2\pi]$ variatsion masalaning $y^0(x) = x$ joiz funksiyalar bo'ylab Yakobi tenglamasini Maple paketidan foydalanib tuzing.
37.	3	A	8	$J(y) = \int_0^1 (y'^2 + 2y'x^2) dx \rightarrow \min, y(0) = 0, y(1) = 1, y \in C^{(1)}[0; 1]$ variatsion masalaning $y^0(x) = x$ joiz funksiyalar bo'ylab Yakobi tenglamasini Maple paketidan foydalanib tuzing.
38.	1	A	8	$J(y) = \int_0^1 (y'^2 + y^2 + 4y(y' - x^3)) dx \rightarrow \min, y(0) = 1, y(1) = 0, y \in C^{(1)}[0; 1]$ variatsion masalaning $y^0(x) = x$ joiz funksiyalar bo'ylab Yakobi tenglamasini tuzing. Maple paketida foydalanib masalaning yechilish algoritmini yozing.
39.	2	A	8	$J(y) = \int_{\pi}^{2\pi} (y'^2 + y^2 - y'(y + \cos x)) dx \rightarrow \min, y(\pi) = -1, y(2\pi) = 0, y \in C^{(1)}[\pi; 2\pi]$ variatsion masalaning $y^0(x) = x$ joiz funksiyalar bo'ylab Yakobi tenglamasini tuzing.
40.	2	A	8	$J(y) = \int_0^1 (y'^2 - 4y^2 + 2y(y' - x^3)) dx \rightarrow \min, y(0) = 1, y(1) = 0, y \in C^{(1)}[0; 1]$ variatsion masalada kuchsiz lokal ekstremalni toping.
41.	1	A	8	$J(y) = \int_{\pi}^{2\pi} (y'^2 + y^2 - 3y'(y + \sin x)) dx \rightarrow \min, y(\pi) = -1, y(2\pi) = 0, y \in C^{(1)}[\pi; 2\pi]$ variatsion masalada kuchsiz lokal ekstremalini Maple paketidan foydalanib tuzing.

42.	2	A	9	$J(y) = \int_0^1 (y'^2 - y^2 - 3y(y' - x^3)) dx \rightarrow \min, y(0) = 1, y(1) = 0, y \in C^{(1)}[0;1]$ variatsion masalada kuchsiz lokal ekstremalini Maple paketidan foydalanib tuzing.
43.	1	A	9	$J(y) = \int_{\pi}^{2\pi} (y'^2 + 4y^2 - y'(y + \sin x)) dx \rightarrow \min, y(\pi) = -1, y(2\pi) = 0, y \in C^{(1)}[\pi; 2\pi]$ variatsion masalada kuchsiz lokal ekstremalni Maple paketidan foydalanib toping.
44.	3	A	9	$J(y_1, y_2) = \int_0^1 (y_1'^2 + y_2'^2 - 3y_1'y_2' + 4y_1^2) dx \rightarrow \min,$ $y_1(0)=1, y_2(0)=1, y_1(1)=0, y_2(1)=-1, y_1, y_2 \in C^{(1)}[0:1].$ masala uchun Eyler tenglamalari sistemasini Maple paketidan foydalanib tuzing.
45.	2	A	9	$J(y) = \int_0^1 (y''^2 + y'^2 - 2y'x^3) dx \rightarrow \min, y_0(0)=0, y_0'(0)=0, y_0(1)=1, y_0'(1)=-1,$ $y \in C^{(2)}[0:1],$ variatsion masala uchun Eyler – Puasson tenglamasini Maple paketidan foydalanib tuzing.
46.	2	A	9	$J[z(x, y)] = \iint_D \left[\left(\frac{\partial z}{\partial x} \right)^2 - \left(\frac{\partial z}{\partial y} \right)^2 \right] dx dy$ funksional uchun Eyler - Ostrogradskiy tenglamasini Maple paketidan foydalanib tuzing.
47.	3	A	10	$J(y, z) = \int_{-1}^1 (2y'z' + y^2 + z^2 + 2ze^x) dx; \quad \begin{matrix} y(-1)=3; & z(-1)=0; \\ y(1)=1; & z(1)=2; \end{matrix}$ masala uchun Eyler tenglamalari sistemasini Maple paketida foydalanib tuzing.
48.	3	A	10	$J(y, z) = \int_{-1}^1 (y^2 + 4yz + z^2 - y'^2 - z'^2 + 2ye^{-x}) dx; \quad \begin{matrix} y(-1)=2; & z(-1)=0; \\ y(1)=0; & z(1)=2; \end{matrix}$ masala uchun Eyler tenglamalari sistemasini Maple paketida foydalanib tuzing.

49.	3	A	10	$J(y, z) = \int_0^2 (2y'z' + y^2 + z^2 + 2z \cos x) dx$; $y(0)=1$; $z(0)=-2$; $y(2)=-1$; $z(2)=1$; masala uchun Eyler tenglamalari sistemasini Maple paketida foydalanib tuzing.
50.	3	A	10	$J(y, z) = \int_{-2}^2 (2y'z' + y^2 - z^2 + 2ye^x) dx$; $y(-2)=0$; $z(-2)=2$; $y(2)=3$; $z(2)=1$; masala uchun Eyler tenglamalari sistemasini Maple paketida foydalanib tuzing.
51.	2	A	10	$J(y) = \int_0^1 (y''' - 2y'^2 + y^2 - 2ye^x) dx$; $y(0)=2$; $y(1)=0$; $y'(0)=1$; $y'(1)=-1$; variatsion masala uchun Eyler – Puasson tenglamasini Maple paketida foydalanib tuzing.
52.	2	A	10	$J(y) = \int_0^1 (y''' - y^2 + 2y \sin x) dx$; $y(0)=2$; $y(1)=0$; $y'(0)=1$; $y'(1)=-1$; variatsion masala uchun Eyler – Puasson tenglamasini Maple paketida foydalanib tuzing.
53.	1	A	10	$J(y) = \int_0^1 (y''' - 2y'^2 + y^2 + 2ye^{-x}) dx$; $y(0)=2$; $y(1)=0$; $y'(0)=1$; $y'(1)=-1$; variatsion masala uchun Eyler – Puasson tenglamasini Maple paketida foydalanib tuzing.
54.	1	A	10	$J(y) = \int_0^1 (y''' - y^2 + ye^x) dx$; $y(0)=2$; $y(1)=0$; $y'(0)=1$; $y'(1)=-1$; variatsion masala uchun Eyler – Puasson tenglamasini Maple paketidan foydalanib tuzing.
55.	2	A	10	Ushbu $\int [(y'')^2 + (12x - 6)y] dx \rightarrow \min(\max)$ masalaning ekstremallarini toping.
56.	1	A	11	Maple dasturida foydalangan holda oddiy differensial tenglamalarni yeching $\frac{dy}{dx} = -3y - 2z + 3x + 1$
57.	2	A	11	Maple dasturida foydalangan holda xususiy hosilali tenglamaning yechimini toping: $x \frac{dx}{dt} + 2 = 7$

58.	3	A	11	Maple dasturida foydalangan holda differensial tenglamani yeching: $\frac{dy}{dx} + y \cos x = \frac{1}{2} \sin 2x$
59.	3	A	11	Maple dasturida foydalangan holda keltirilgan differensial tenglamani yeching: $5y'' + 3y' - 2y = 0$
60.	3	A	12	$y' - 2y = 3e^x$ $y(0.3) = 1$ tenglamani Maple paketidan foydalanib yeching.
61.	3	A	12	$y'' - 4y' + 4y = 0$ $y(0) = 1, y'(0) = 0$ differensial tenglamani Maple paketidan foydalanib yeching.
62.	2	A	12	$y' - 2xy = x^2$ $y(1) = 0$ differensial tenglamani Maple paketidan foydalanib yeching.
63.	1	A	12	$y' - y = e^x$ $y(0) = 2$ differensial tenglamani Maple paketidan foydalanib yeching.
64.	2	A	13	$y' + 3y = x^2$ $y(1) = -1$ differensial tenglamani Maple paketidan foydalanib yeching.
65.	3	A	13	$y'' + 4y = \cos x$ $y(0) = 3, y'(0) = 0$ differensial tenglamani Maple paketidan foydalanib yeching.
66.	2	A	14	$y'' + 5y' + 6y = e^x$ $y(0) = 1, y'(0) = 2$ differensial tenglamani Maple paketidan foydalanib yeching.
67.	3	A	10	$J(y) = \int_{-1}^1 (x^2 + y^2 + y'^2) dx; \quad \begin{cases} y(-1) = 1; \\ y(1) = 2. \end{cases}$ Ushbu funksionalning $\int_{x_1}^{x_2} y dx = 1$ izoperimetrik shartni qanoatlantiruvchi joiz ekstremalini toping.

68.	3	A	11	$J(y) = \int_{-1}^1 (x^2 + y^2 + y'^2) dx; \quad \begin{cases} y(-1)=1; \\ y(1)=2. \end{cases}$ Ushbu funksionalning $\int_{x_1}^{x_2} y dx = 4$ izoperimetrik shartni qanoatlantiruvchi joiz ekstremalini toping.
69.	3	A	11	$J(y) = \int_{-1}^1 (x^2 + y^2 + y'^2) dx; \quad \begin{cases} y(-1)=1; \\ y(1)=2. \end{cases}$ Ushbu funksionalning $\int_{x_1}^{x_2} y dx = 2$ izoperimetrik shartni qanoatlantiruvchi joiz ekstremalini toping.
70.	2	A	11	$J(y) = \int_{-1}^1 (x^2 + y^2 + y'^2) dx; \quad \begin{cases} y(-1)=1; \\ y(1)=2. \end{cases}$ Ushbu funksionalning $\int_{x_1}^{x_2} y dx = 0.5$ izoperimetrik shartni qanoatlantiruvchi joiz ekstremalini toping.
71.	1	A	11	$J(y) = \int_{-1}^1 (x^2 + y^2 + y'^2) dx; \quad \begin{cases} y(-1)=1; \\ y(1)=2. \end{cases}$

				Ushbu funksionalning $\int_{x_1}^{x_2} (x+y)dx=4$ izoperimetrik shartni qanoatlantiruvchi joiz ekstremalini toping.
72.	2	A	12	Ushbu $I(u) = \int_0^1 (u_1^2 + u_2^2)dt$, funksionalning minimumini, boshqarishga $u_1 \geq 1, \forall t \in [0,1], u_2 \in R$ bog'lanishlar qatnashganda toping.
73.	3	A	12	Ushbu $I(u) = \int_0^T (4u_1 + 3u_2)dt$ funksionalning minimumini $u_1^2 + u_2^2 \leq 1, t \in [0, T]$ bog'lanishlar qatnashganda toping.
74.	3	A	12	Terminal boshqaruv masalasida Gamilton Pontryagin funksiyasi, qo'shma sistema, optimallik shartini qanoatlantiruvchi boshqarishning ko'rinishini toping. $J(u) = x_1(1) + x_2(1) \rightarrow \min, x_1 = x_2, x_2 = -x_1 + u,$ $x_1(0) = x_2(0) = 0, u(t) \leq 1, t \in T = [0, 1]$
75.	2	A	13	Terminal boshqaruv masalasida Gamilton Pontryagin funksiyasi, qo'shma sistema, optimallik shartini qanoatlantiruvchi boshqarishning ko'rinishini toping. $J(u) = x_1^2(1) + x_2(1) \rightarrow \min, x_1 = 2x_1, x_2 = x_2 + u,$

				$x_1(0) = x_2(0) = 0, u(t) \leq 2, t \in T = [0, 1]$
76.	1	A	13	Terminal boshqaruv masalasida Gamilton Pontryagin funksiyasi, qo'shma sistema, optimallik shartini qanoatlantiruvchi boshqarishning ko'rinishini toping. $J(u) = 2x_1(1) - x_2^2(1) \rightarrow \min, x_1 = x_1 - x_2, x_2 = x_2 + u,$ $x_1(0) = x_2(0) = 0, u(t) \leq 3, t \in T = [0, 1]$
77.	2	A	14	Terminal boshqaruv masalasida Gamilton Pontryagin funksiyasi, qo'shma sistema, optimallik shartini qanoatlantiruvchi boshqarishning ko'rinishini toping. $J(u) = x_1^2(1) - x_2^2(1) \rightarrow \min, x_1 = x_1^2 - 2u, x_2 = x_1 + 2x_2,$ $x_1(0) = x_2(0) = 0, u(t) \leq 4, t \in T = [0, 1]$
78.	3	A	10	Terminal boshqaruv masalasida Gamilton Pontryagin funksiyasi, qo'shma sistema, optimallik shartini qanoatlantiruvchi boshqarishning ko'rinishini toping. $J(u) = x_1^2(1) - x_1(1)x_2(1) \rightarrow \min, x_1 = x_1^2 + x_2, x_2 = x_1 - x_2 - u,$ $x_1(0) = x_2(0) = 0, u(t) \leq 5, t \in T = [0, 1]$
79.	2	A	11	Terminal boshqaruv masalasida Gamilton Pontryagin funksiyasi, qo'shma sistema, optimallik shartini qanoatlantiruvchi boshqarishning ko'rinishini toping. $J(u) = 3x_1(2) - x_2(2) \rightarrow \min, x_1 = -x_2 - u, x_2 = x_1 + x_2,$

				$x_1(0) = x_2(0) = 0, u(t) \leq 1, t \in T = [0, 2]$
80.	3	A	11	Quyidagi optimal boshqaruv masalalarida Gamilton-Pontryagin funksiyasini tuzing va optimal boshqarishni toping. $\int_0^T u^2 dt \rightarrow \inf,$ $x = u, x(0) = x^0, x(T) = x'.$
81.	3	A	11	Quyidagi optimal boshqaruv masalalarida Gamilton-Pontryagin funksiyasini tuzing va optimal boshqarishni toping. $\int_0^T u^2 dt + \lambda x^2(T) \rightarrow \inf,$ $x = u, x(0) = x^0$
82.	3	A	11	Quyidagi optimal boshqaruv masalalarida Gamilton-Pontryagin funksiyasini tuzing va optimal boshqarishni toping. $\int_0^T u^2 dt \rightarrow \inf,$ $x = x + u, x(0) = x^0, x(T) = x'.$
83.	2	A	12	Quyidagi optimal boshqaruv masalalarida Gamilton-Pontryagin funksiyasini tuzing va optimal boshqarishni toping.

				$\int_0^T (1 - u)\sqrt{x} dt \rightarrow \inf,$ $x = u\sqrt{x} - ux, u \leq 1, x(0) = 0, x(T) = x_T$
84.	1	A	12	Terminal boshqaruv masalasida Gamilton - Pontryagin funksiyasi, qo'shma sistema, optimallik shartini qanoatlantiruvchi boshqarishning ko'rinishini toping. $J(u) = x_1(1) + x_2(1) \rightarrow \min, x_1 = x_2, x_2 = -x_1^2 + u,$ $x_1(0) = x_2(0) = 0, u(t) \leq 1, t \in T = [0.1]$
85.	2	A	12	Terminal boshqaruv masalasida Gamilton - Pontryagin funksiyasi, qo'shma sistema, optimallik shartini qanoatlantiruvchi boshqarishning ko'rinishini toping. $J(u) = x_1^2(1) + x_2(1) \rightarrow \min, x_1 = 2x_2, x_2 = x_2 + u,$ $x_1(0) = x_2(0) = 0, u(t) \leq 2, t \in T = [0.1]$
86.	3	A	13	Terminal boshqaruv masalasida Gamilton - Pontryagin funksiyasi, qo'shma sistema, optimallik shartini qanoatlantiruvchi boshqarishning ko'rinishini toping. $J(u) = 2x_1(1) - x_2^2(1) \rightarrow \min, x_1 = x_1 - x_2, x_2 = x_2 + u,$ $x_1(0) = x_2(0) = 0, u(t) \leq 3, t \in T = [0.1]$

87.	3	A	13	Terminal boshqaruv masalasida Gamilton - Pontryagin funksiyasi, qo'shma sistema, optimallik shartini qanoatlantiruvchi boshqarishning ko'rinishini toping. $J(u) = x_1^2(1) + x_2^2(1) \rightarrow \min, \quad x_1 = x_1^2 - 2u, \quad x_2 = x_1 + x_2,$ $x_1(0) = x_2(0) = 0, \quad u(t) \leq 4, \quad t \in T = [0.1]$
88.	2	A	14	Terminal boshqaruv masalasida Gamilton - Pontryagin funksiyasi, qo'shma sistema, optimallik shartini qanoatlantiruvchi boshqarishning ko'rinishini toping. $J(u) = x_1^2(1) + x_1(1)x_2(1) \rightarrow \min, \quad x_1 = x_1 + x_2, \quad x_2 = x_1 - x_2 - u,$ $x_1(0) = x_2(0) = 0, \quad u(t) \leq 5, \quad t \in T = [0.1]$
89.	1	A	10	Terminal boshqaruv masalasida Gamilton - Pontryagin funksiyasi, qo'shma sistema, optimallik shartini qanoatlantiruvchi boshqarishning ko'rinishini toping. $J(u) = 3x_1(2) - x_2(2) \rightarrow \min, \quad x_1 = -x - u_2, \quad x_2 = x_1 + x_2,$ $x_1(0) = x_2(0) = 0, \quad u(t) \leq 1, \quad t \in T = [0.2]$
90.	2	A	11	Dinamik programmashtirish usulidan foydalanib, quyidagi masalalarni yeching. $x_1^2 + x_2^2 + \frac{1}{2}x_2 + 4x_3 \rightarrow \max, \quad 2x_1 + x_2 + x_3 = 11, \quad x_i \geq 0, i = 1, 2, 3;$

91.	3	A	11	Dinamik programmashtirish usulidan foydalanib, quyidagi masalalarni yeching. $\frac{1}{2}x_1^2 + 3x_2 + x_3^3 - x_3^2 \rightarrow \max, \quad x_1 + 2x_2 + x_3 = 9 \quad x_i \geq 0, i = 1, 2, 3;$
92.	2	A	11	Dinamik programmashtirish usulidan foydalanib, quyidagi masalalarni yeching. $x_1^3 + 2x_2^2 + 2x_3^3 - x_3 \rightarrow \max, \quad x_1 + 2x_2 + 3x_3 = 10, \quad x_i \geq 0, i = 1, 2, 3;$
93.	3	A	11	Dinamik programmashtirish usulidan foydalanib, quyidagi masalalarni yeching. $2x_1^2 + \frac{1}{3}x_2^3 + 10x_3 \rightarrow \max, \quad 3x_1 + x_2 + x_3 = 12, \quad x_i \geq 0, i = 1, 2, 3;$
94.	3	A	12	Dinamik programmashtirish usulidan foydalanib, quyidagi masalalarni yeching. $\frac{1}{4}x_1^2 + \frac{1}{6}x_2^2 + \frac{1}{12}x_3^2 \rightarrow \max, \quad 3x_1 + 2x_2 + 4x_3 = 16, \quad x_i \geq 0, i = 1, 2, 3;$
95.	3	A	12	Dinamik programmashtirish usulidan foydalanib, quyidagi masalalarni yeching. $e^{x_1} + x_2^4 + 5x_3^2 \rightarrow \max,$ $x_1 + 3x_2 + 2x_3 = 14,$ $x_i \geq 0, i = 1, 2, 3;$
96.	2	A	12	Dinamik programmashtirish usulidan foydalanib, quyidagi masalalarni yeching. $2^{x_1}x_2^2 + x_3^2 - x_3 \rightarrow \max, \quad 3x_1 + x_2 + 3x_3 = 16, \quad x_i \geq 0, i = 1, 2, 3;$

97.	1	A	13	Dinamik programmalashtirish usulidan foydalanib, quyidagi masalalarni yeching. $\frac{1}{3}x_1^3 + e^{x_2} - x_2 + 8x_3 \rightarrow \max, \quad x_1 + 4x_2 + x_3 = 15, \quad x_i \geq 0, i = 1, 2, 3;$
98.	2	A	13	Dinamik programmalashtirish usulidan foydalanib, quyidagi masalalarni yeching. $3x_1^2 + 2x_2^2 + e^{x_3} - 6x_3 + x_4^2 \rightarrow \max, \quad x_1 + 2x_2 + 3x_3 + 4x_4 \leq 8, \quad x_i \geq 0, i = \overline{1, 4};$
99.	3	A	14	Dinamik programmalashtirish usulidan foydalanib, quyidagi masalalarni yeching. $\frac{1}{2}x_1^3 + x_2^2 + x_3^3 + x_3 + 7x_4 \rightarrow \max, \quad x_1 + 2x_2 + 3x_3 + 4x_4 \leq 8, \quad x_i \geq 0, i = \overline{1, 4};$
100.	3	A	10	Dinamik programmalashtirish usulidan foydalanib, quyidagi masalalarni yeching. $6x_1^2 + 12x_2 + e^{x_3} + x_4^2 \rightarrow \max, \quad x_1 + x_2 + 2x_3 + x_4 \leq 9, \quad x_i \geq 0, i = \overline{1, 4};$