



Kattaqo'rg'on davlat pedagogika instituti Aniq va tabiiy fanlar fakulteti
4-bosqich Matematika yo'nalishi talabalariga 8-semestr uchun
« Variatsion hisob va optimallashtirish hisoblari »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	$\left. \begin{aligned} J[y] &= \int_1^2 (y'^2 + 4xy) dx \rightarrow \text{extr} \\ y(1) &= 0, \quad y(2) = -1 \end{aligned} \right\}$ Yuqoridagi masala uchun Eyler tenglamasini tuzing va maple paketidan foydalanib differensial tenglamani yeching.
2.	1	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 Eyler tenglamasini tuzing va maple paketidan foydalanib differensial tenglamani yeching.

3.	1	A	2	$\left. \begin{aligned} J[y] &= \int_1^3 (3x - y) y dx \rightarrow extr \\ y(1) &= 1, \quad y(3) = 4. \end{aligned} \right\}$ Keltirilgan masala uchun Maple paketidan foydalanib Eyler tenglamasini tuzing.
4.	1	A	2	$\left. \begin{aligned} J[y] &= \int_1^3 (3x - y^2) y dx \rightarrow extr \\ y(1) &= 1, \quad y(3) = 4. \end{aligned} \right\}$ Keltirilgan masala uchun joiz statsionar funksiyasini aniqlang. Masalani yechishda maple paketidan foydalaning.
5.	3	A	2	$\left. \begin{aligned} J[y] &= \int_1^{2\pi} (y'^2 - y^2) dx \rightarrow extr \\ y(0) &= 1, \quad y(2\pi) = 1 \end{aligned} \right\}$ Maple paketidan foydalanib keltirilgan masala uchun joiz statsionar funksiyasini aniqlang va grafigini chizing.
6.	1	A	2	$\left. \begin{aligned} J[y] &= \int_1^2 (y'^2 + 4xy) dx \rightarrow extr \\ y(1) &= 0, \quad y(2) = -1 \end{aligned} \right\}$ 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	$J(y) = \int_0^1 (y'^3 - 5ye^x) dx \rightarrow \min; y(0) = 0, y(1) = 1, y \in C^{(1)}[0;1]$ variatsion hisob asosiy masalasida Eyler tenglamasini tuzing.
10.	1	A	2	$J(y) = \int_0^2 (y'^2 - 3y' + 4y^2) dx \rightarrow \min, y(0) = 0, y(2) = 1, y \in C^{(1)}[0;2]$ 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	$J(y) = \int_0^1 (y'^3 - e^{3x}) dx \rightarrow \min; y(0) = 0, y(1) = 1, y \in C^{(1)}[0;1]$ variatsion hisob asosiy masalasida Eyler tenglamasini tuzing.
13.	2	A	3	$J(y) = \int_0^1 (4y'^2 - 5yy' + y^2) dx \rightarrow \min, y(0) = 0, y(1) = 1, y \in C^{(1)}[0;1]$ variatsion hisob asosiy masalasini Maple paketidan foydalanib yeching.
14.	1	A	3	$J(y) = \int_0^2 (y'^2 - 3xy' - 4y^2) dx \rightarrow \min, y(0) = 0, y(2) = 1, y \in C^{(1)}[0;2]$ 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 tuzing.
17.	1	A	4	$J(y) = \int_0^2 (y'^2 + 7xy') dx \rightarrow \min; y(0) = 0, y(2) = 1, y \in C^{(1)}[0;2]$ variatsion hisob asosiy masalasida joiz statsionar funksiyani toping.
18.	1	A	5	$J(y) = \int_0^{\pi} (y'^2 - 2y' \sin x) dx \rightarrow \min; y(0) = 1, y(\pi) = 0, y \in C^{(1)}[0;\pi]$ variatsion hisob asosiy masalasida joiz statsionar funksiyani toping.
19.	2	A	5	$J(y) = \int_0^1 (y'^2 + xy) dx \rightarrow \min; y(0) = 0, y(1) = 2, y \in C^{(1)}[0;1]$ variatsion hisob asosiy masalasida joiz statsionar funksiyani toping.
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 funksiyani toping.
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 hollari bilan yeching.

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 hollari bilan yeching.
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 hollari bilan yeching.
24.	2	A	7	$J(y) = \int_{-1}^1 (y'^3 + 5xyy' - x^2y)dx$ 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 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	$J(y) = \int_0^1 (y'^2 + 3y^2 - y'(y + x^2))dx$ funksionalning ikkinchi variatsiyasini hisoblang.
29.	2	A	7	$J(y) = \int_{-1}^1 (y'^3 - 6xyy')dx$ funksionalning ikkinchi variatsiyasini hisoblang.
30.	2	A	7	$J(y) = \int_{\pi}^{2\pi} (y'^2 - 5y(y' - 2y \sin 2x))dx$ 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 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 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 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.
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 maple paketida kuchsiz lokal ekstremalni toping va grafigini chizing.
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 ekstremalni toping.
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 ekstremalni toping.
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 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 tuzing.
45.	2	A	9	$J(y) = \int_0^1 (y''^2 + y'^2 - 2y'x^3) dx \rightarrow \min, \quad y_0(0) = 0, \quad y'_0(0) = 0, \quad y_0(1) = 1, \quad y'_0(1) = -1,$ $y \in C^{(2)}[0:1],$ variatsion masala uchun Eyler – Puasson tenglamasini 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 tuzing.
47.	3	A	10	$J(y, z) = \int_{-1}^1 (2y'z' + y^2 + z^2 + 2ze^x) dx; \quad y(-1)=3; \quad z(-1)=0; \quad y(1)=1; \quad z(1)=2;$ masala uchun Eyler tenglamalari sistemasini tuzing.
48.	3	A	10	$J(y, z) = \int_{-1}^1 (y^2 + 4yz + z^2 - y'^2 - z'^2 + 2ye^{-x}) dx; \quad y(-1)=2; \quad z(-1)=0; \quad y(1)=0; \quad z(1)=2;$ masala uchun Eyler tenglamalari sistemasini tuzing.
49.	3	A	10	$J(y, z) = \int_0^2 (2y'z' + y^2 + z^2 + 2z \cos x) dx; \quad y(0)=1; \quad z(0)=-2; \quad y(2)=-1; \quad z(2)=1;$ masala uchun Eyler tenglamalari sistemasini tuzing.
50.	3	A	10	$J(y, z) = \int_{-2}^2 (2y'z' + y^2 - z^2 + 2ye^x) dx; \quad y(-2)=0; \quad z(-2)=2; \quad y(2)=3; \quad z(2)=1;$ masala uchun Eyler tenglamalari sistemasini tuzing.
51.	2	A	10	$J(y) = \int_0^1 (y''^2 - 2y'^2 + y^2 - 2ye^x) dx; \quad y(0)=2; \quad y(1)=0; \quad y'(0)=1; \quad y'(1)=-1;$ variatsion masala uchun maple paketida Eyler – Puasson tenglamasini tuzing.

52.	2	A	10	$J(y) = \int_0^1 (y''^2 - y^2 + 2y \sin x) dx;$ $y(0)=2; \quad y(1)=0;$ $y'(0)=1; \quad y'(1)=-1;$ variatsion masala uchun Eyler – Puasson tenglamasini tuzing.
53.	1	A	10	$J(y) = \int_0^1 (y''^2 - 2y'^2 + y^2 + 2ye^{-x}) dx;$ $y(0)=2; \quad y(1)=0;$ $y'(0)=1; \quad y'(1)=-1;$ variatsion masala uchun Eyler – Puasson tenglamasini tuzing.
54.	1	A	10	$J(y) = \int_0^1 (y''^2 - y^2 + ye^x) dx;$ $y(0)=2; \quad y(1)=0;$ $y'(0)=1; \quad y'(1)=-1;$ variatsion masala uchun Eyler – Puasson tenglamasini tuzing.
55.	2	A	10	Ushbu $\int [(y'')^2 + (12x - 6)y] dx \rightarrow \min(\max)$ masalaning ekstremallarini toping.
56.				Ushbu $J(y) = \int_0^{x_1} \frac{\sqrt{1 + y'^2}}{y} dx$ funksional $y(0) = 0$ chegaraviy shartda: (x_1, y_1) nuqta $y = x - 5$ to'g'ri chiziq bo'ylab o'zgarganda ekstremumga ega bo'lishi mumkin bo'lgan egri chiziqlar topilsin.
57.	2	A	11	Ushbu

				$J(y) = \int_0^{x_1} \frac{\sqrt{1+y'^2}}{y} dx$ funksional $y(0) = 0$ chegaraviy shartda: (x_1, y_1) nuqta $(x-9)^2 + y^2 = 9$ aylana bo'ylab o'zgarganda ekstremumga ega bo'lishi mumkin bo'lgan egri chiziqlar topilsin.
58.	1	A	11	$y=x^2$ parabola va $y=x-5$ to'g'ri chiziq orasidagi masofani toping . $J(y) = \int_{x_0}^{x_1} \sqrt{1+y'^2} dx$
59.	3	A	11	Ushbu $J(y) = \int_{x_0}^{x_1} A(x, y) \sqrt{1+y'^2} dx$ ko'rinishdagi funksional uchun transversallik shartining ko'riinishini toping .
60.	3	A	11	Ushbu $\int_0^1 [(y'')^2 + (12x-6)y] dx \rightarrow \min(\max)$ masalaning ekstremallarini toping. $y'(0) = 0, \quad y'(1) = 0$
61.	2	A	11	Agar egri chiziqlarning chap cheti $y(x) = \varphi(x) = 2x^2 + 2$ egri chiziqning, o'ng cheti esa, $y(x) = \psi(x) = x$ egri chiziqning nuqtalarida yotishi ma'lum bo'lsa, ular ichida

				$J(y) = \int_{x_0}^{x_1} \sqrt{1 + y'^2} dx$ funksional ekstremumga erishadigan egri chiziqni toping va grafigini chizing.
62.	1	A	11	Agar egri chiziqlarning chap cheti $y(x) = \varphi(x) = -x^2 + 2$ egri chiziqning, o'ng cheti esa, $y(x) = \psi(x) = -x$ egri chiziqning nuqtalarida yotishi ma'lum bo'lsa, ular ichida $J(y) = \int_{x_0}^{x_1} \sqrt{1 + y'^2} dx$ funksional ekstremumga erishadigan egri chiziqni toping va grafigini chizing.
63.	2	A	11	Agar egri chiziqlarning chap cheti $y(x) = \varphi(x) = 3x^2 + 2$ egri chiziqning, o'ng cheti esa, $y(x) = \psi(x) = 2x$ egri chiziqning nuqtalarida yotishi ma'lum bo'lsa, ular ichida $J(y) = \int_{x_0}^{x_1} \sqrt{1 + y'^2} dx$ funksional ekstremumga erishadigan egri chiziqni toping va grafigini chizing.
64.	1	A	11	Agar egri chiziqlarning chap cheti $y(x) = \varphi(x) = 2x^2 + 2$ egri chiziqning, o'ng cheti esa, $y(x) = \psi(x) = 2x$ egri chiziqning nuqtalarida yotishi ma'lum bo'lsa, ular ichida

				$J(y) = \int_{x_0}^{x_1} \sqrt{1 + y'^2} dx$ funksional ekstremumga erishadigan egri chiziqni toping va grafigini chizing.
65.	3	A	11	Agar egri chiziqlarning chap cheti $y(x) = \varphi(x) = x^2 + 2$ egri chiziqning, o'ng cheti esa, $y(x) = \psi(x) = -2x$ egri chiziqning nuqtalarida yotishi ma'lum bo'lsa, ular ichida $J(y) = \int_{x_0}^{x_1} \sqrt{1 + y'^2} dx$ funksional ekstremumga erishadigan egri chiziqni toping va grafigini chizing.
66.	2	A	11	Quyidagi $\begin{cases} J(y) = \int_{-1}^1 (x^2 + y^2 + y'^2) dx \rightarrow \min(\max) \\ y(-1) = 1 \end{cases}$ chap cheti qo'zg'olmas, o'ng cheti esa, jadvalda berilgan $y = \psi(x) = e^x - 2$ funksiya bo'ylab o'zgaradigan variatsion masalaning eketremalini toping va maple paketida grafigini chizing.

67.	3	A	11	$\begin{cases} J(y) = \int_{-1}^1 (x^2 + y^2 + y'^2) dx \rightarrow \min(\max) \\ y(-1) = 1 \end{cases}$ chap cheti qo'zg'olmas, o'ng cheti esa, jadvalda berilgan $\psi(x) = 2e^{2x} - 2$ funksiya bo'ylab o'zgaradigan variatsion masalaning eketremalini toping va maple paketida grafigini chizing.
68.	3	A	11	$\begin{cases} J(y) = \int_{-1}^1 (x^2 + y^2 + y'^2) dx \rightarrow \min(\max) \\ y(-1) = 1 \end{cases}$ chap cheti qo'zg'olmas, o'ng cheti esa, jadvalda berilgan $\psi(x) = e^{2x-2} - 5$ funksiya bo'ylab o'zgaradigan variatsion masalaning eketremalini toping va maple paketida grafigini chizing.
69.	3	A	11	Maple dasturida foydalangan holda keltirilgan differensial tenglamani yeching: $5y'' + 3y' - 2y = 0$
70.	3	A	11	$\begin{cases} J(y) = \int_{-1}^1 (x^2 + y^2 + y'^2) dx \rightarrow \min(\max) \\ y(-1) = 1 \end{cases}$

				chap cheti qo'zg'olmas, o'ng cheti esa, jadvalda berilgan $\psi(x) = e^{2x-1} - 5$ funksiya bo'ylab o'zgaradigan variatsion masalaning eketremalini toping va maple paketida grafigini chizing.
71.	2	A	11	Quyidagi $\left[\begin{array}{l} J(y) = \int_{-1}^1 (x^2 + y^2 + y'^2) dx \rightarrow \min(\max) \\ y(1) = 1 \end{array} \right.$ o'ng cheti qo'zg'olmas, chap cheti esa, jadvalda berilgan $\varphi(x) = 2 + e^{2x}$ funksiya bo'ylab o'zgaradigan variatsion masalaning eketremalini toping.
72.	2	A	11	$\left[\begin{array}{l} J(y) = \int_{-1}^1 (x^2 + y^2 + y'^2) dx \rightarrow \min(\max) \\ y(1) = 1 \end{array} \right.$ o'ng cheti qo'zg'olmas, chap cheti esa, jadvalda berilgan $\varphi(x) = 2 + x$ funksiya bo'ylab o'zgaradigan variatsion masalaning eketremalini toping va maple paketidan foylanib grafigini chizing.
73.	1	A	11	Ushbu $J[y_1, y_2] = \int_0^1 [y_1^2 + 2y_2^2 - y_1'^2 + y_2'^2] dx$

				funksionalning $y_1(0) = 1, y_2(0) = -1, y_1\left(\frac{\pi}{2}\right) = 1, y_2\left(\frac{\pi}{2}\right) = 1$ chegaraviy shartlarni va $y_1 - y_2 + 2\sin x = 0$ bog`lanishlarni qanoatlantiradigan ekstremalini toping.
74.	1	A	11	$J[y_1, y_2] = \int_0^1 [y_1^2 + 3y_2^2 - 2y_1'^2 + y_2'^2] dx$ funksionalning $y_1(0) = 1, y_2(0) = -1, y_1\left(\frac{\pi}{2}\right) = 1, y_2\left(\frac{\pi}{2}\right) = 1$ chegaraviy shartlarni va $y_1 - y_2 + 2\sin x = 0$ bog`lanishlarni qanoatlantiradigan ekstremalini toping.
75.	2	A	11	$J[y_1, y_2] = \int_0^1 [y_1^2 - y_2^2 + y_1'^2 + y_2'^2] dx$ funksionalning $y_1(0) = 1, y_2(0) = -1, y_1\left(\frac{\pi}{2}\right) = 1, y_2\left(\frac{\pi}{2}\right) = 1$ chegaraviy shartlarni va $y_1 - y_2 + 2\sin x = 0$ bog`lanishlarni qanoatlantiradigan ekstremalini toping.

76.	1	A	11	$J[y_1, y_2] = \int_{-1}^1 [2y_1^2 + y_2^2 - y_1' + y_2'^2] dx$ funksionalning $y_1(-1) = 1, y_2(-1) = 0, y_1(1) = 2, y_2(1) = 1$ chegaraviy shartlarni va $y_1' - y_2 = 0$ differensial bog'lanishni qanoatlantruvchi ekstremalini toping va grafigini chizng.
77.	3	A	11	$J[y_1, y_2] = \int_{-1}^1 [2y_1^2 + y_2^2 - y_1' + 2y_2'^2] dx$ funksionalning $y_1(-1) = 1, y_2(-1) = 0, y_1(1) = 2, y_2(1) = 1$ chegaraviy shartlarni va $y_1' - y_2 = 0$ differensial bog'lanishni qanoatlantruvchi ekstremalini toping va grafigini chizing.
78.	3	A	12	$J[y_1, y_2] = \int_{-1}^1 [0.5y_1^2 + y_2^2 - y_1' - y_2'^2] dx$

				funksionalning $y_1(-1) = 1, y_2(-1) = 0, y_1(1) = 2, y_2(1) = 1$ chegaraviy shartlarni va $y_1' - y_2 = 0$ differensial bog'lanishni qanoatlantruvchi ekstremalini toping va grafigini chizing.
79.	3	A	12	Ushbu $J(y) = \int_{-1}^1 (x^2 + y^2 + y'^2) dx; \quad \begin{cases} y(-1)=1; \\ y(1)=2. \end{cases}$ funksionalning $\int_{x_1}^{x_2} y dx = 1$ izoperimetrik shartni qanoatlantiruvchi joiz ekstremalini toping va maple paketidan foydalanib grafigini chizing. Grafikni chizishda ranglardan foydalaning.
80.	2	A	12	Ushbu $J(y) = \int_{-1}^1 (x^2 + y^2 + y'^2) dx; \quad \begin{cases} y(-1)=1; \\ y(1)=2. \end{cases}$

				funksionalning $\int_{x_1}^{x_2} y dx = 2$ izoperimetrik shartni qanoatlantiruvchi joiz ekstremalini toping va maple paketidan foydalanib grafigini chizing. Grafikni chizishda ranglardan foydalaning.
81.	2	A	12	Ushbu $J(y) = \int_{-1}^1 (x^2 + y^2 + y'^2) dx; \quad \begin{cases} y(-1)=1; \\ y(1)=2. \end{cases}$ funksionalning $\int_{x_1}^{x_2} (x+y) dx = 4$ izoperimetrik shartni qanoatlantiruvchi joiz ekstremalini toping va maple paketidan foydalanib grafigini chizing. Grafikni chizishda ranglardan foydalaning.
82.	3	A	12	$y' - 2y = 3x$ $y(0.3)=1$ Eyler usulini foydalanib tenglamani maple paketidan algoritmini yozing va sonli natijani analitik yechim bilan taqqoslash grafigini chizing.
83.	3	A	12	$y'' - 4y' + 4y = 0$ $y(0) = 1, y'(0) = 0$ differensial tenglamani Maple paketidan foydalanib yeching.
84.	2	A	12	$J(y) = \int_{-1}^1 (x^2 + y^2 + y'^2) dx; \quad \begin{cases} y(-1)=1; \\ y(1)=2. \end{cases}$

				funksionalning $\int_{x_1}^{x_2} (\sin x + y) dx = 5$ izoperimetrik shartni qanoatlantiruvchi joiz ekstremalini toping va maple paketidan foydalanib grafigini chizing. Grafikni chizishda ranglardan foydalaning.
85.	2	A	12	$y' - 2xy = x^2$ $y(1) = 0$ differensial tenglamani Maple paketidan foydalanib yeching.
86.	1	A	12	$y' - y = e^x$ $y(0) = 2$ differensial tenglamani Maple paketidan foydalanib yeching.
87.	2	A	13	$y' + 3y = x^2$ $y(1) = -1$ differensial tenglamani Maple paketidan foydalanib yeching.
88.	3	A	13	$y'' + 4y = \cos x$ $y(0) = 3, y'(0) = 0$ differensial tenglamani Maple paketidan foydalanib yeching.
89.	2	A	13	$J(y) = \int_{-1}^1 (x^2 + y^2 + y'^2) dx; \quad \begin{cases} y(-1) = 1; \\ y(1) = 2. \end{cases}$ funksionalning $\int_{x_1}^{x_2} (x^2 + y + y') dx = 6$ izoperimetrik shartni qanoatlantiruvchi joiz ekstremalini toping va maple paketidan foydalanib grafigini chizing. Grafikni chizishda ranglardan foydalaning.
90.	1	A	13	Terminal boshqaruv masalasida Gamilton - Pontryagin funksiyasi, qo'shma sistema, optimallik shartini qanoatlantiruvchi boshqarishning ko'rinishini toping. $J(u) = x_1(1) + x_2(1) \rightarrow \min, \quad \dot{x}_1 = x_2, \quad \dot{x}_2 = -x_1^2 + u,$ $x_1(0) = x_2(0) = 0, u(t) \leq 1, t \in T = [0, 1]$

91.	3	A	14	Terminal boshqaruv masalasida Gamilton - Pontryagin funksiyasi, qo'shma sistema, optimallik shartini qanoatlantiruvchi boshqarishning ko'rinishini toping. $J(u) = x_1^2(1) + x_2(1) \rightarrow \min, \dot{x}_1 = 2x_1, \dot{x}_2 = x_2 + u,$ $x_1(0) = x_2(0) = 0, u(t) \leq 2, t \in T = [0,1]$
92.	2	A	14	Terminal boshqaruv masalasida Gamilton - Pontryagin funksiyasi, qo'shma sistema, optimallik shartini qanoatlantiruvchi boshqarishning ko'rinishini toping. $J(u) = 2x_1(1) - x_2^2(1) \rightarrow \min, \dot{x}_1 = x_1 - x_2, \dot{x}_2 = x_2 + u,$ $x_1(0) = x_2(0) = 0, u(t) \leq 3, t \in T = [0,1]$
93.	3	A	14	Terminal boshqaruv masalasida Gamilton - Pontryagin funksiyasi, qo'shma sistema, optimallik shartini qanoatlantiruvchi boshqarishning ko'rinishini toping. $J(u) = 3x_1(2) - x_2(2) \rightarrow \min, \dot{x}_1 = -x_2 - u, \dot{x}_2 = x_1 + x_2,$ $x_1(0) = x_2(0) = 0, u(t) \leq 1, t \in T = [0,2]$
94.	2	A	14	$y'' + 5y' + 6y = e^x$ $y(0) = 1, y'(0) = 2$ differensial tenglamani Maple paketidan foydalanib yeching.
95.	1	A	14	Ushbu $I(u) = \int_0^T (u^2 + tu) dt,$ funksionalning minimumini, boshqarishga $ u(t) \leq 1, t \in [0, T], T > 2$

				bog'lanish qatnashganda toping. Maple paketidan foydalanib integralni hisoblang.
96.	2	A	14	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. Maple paketidan foydalanib integralni hisoblang.
97.	2	A	14	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. Maple paketidan foydalanib integralni hisoblang.

98.	1	A	14	Quyidagi optimal boshqaruv masalalarida Gamilton-Pontryagin funksiyasini tuzing va optimal boshqarishni toping. 1. $\int_0^T u^2 dt \rightarrow \inf,$ $\dot{x} = u, \quad x(0) = x^0, \quad x(T) = x'.$
99.	2	A	14	Quyidagi optimal boshqaruv masalalarida Gamilton-Pontryagin funksiyasini tuzing va optimal boshqarishni toping. $\int_0^1 u dt \rightarrow \inf, \quad \ddot{x} + ux = 0, \quad u \leq A, \quad x(0) = 0, \quad x(1) = 0, \quad \dot{x}(0) = 1.$
100.	3	A	14	Quyidagi optimal boshqaruv masalalarida Gamilton-Pontryagin funksiyasini tuzing va optimal boshqarishni toping. $\int_0^T (u^2 x) dt \rightarrow \inf, \quad \dot{x} = u, \quad x(0) = 0, \quad u \leq 1.$