

**Toshkent davlat iqtisodiyot universiteti Samarqand filiali 1-bosqich talabalari
uchun “Hisob 1, 2” fanidan nazorat savollari**

Ishchi mavzu (auditoriya dars mavzulari) yuzasidan savollar:

1. Sonli ketma-ketlik. Sonli ketma-ketlikning limiti
2. Yaqinlashuvchi sonli ketma-ketliklar.
3. Elementar funksiyalar va murakkab funksiyalar.
4. Funksiya limiti va xossalari.
5. Chap va o‘ng limitlar.
6. Funksiya uzluksizligi.
7. Funksiyaning tekis uzluksizligi.
8. Kantor teoremasi
9. Funksiya uzilishi va uzulish turlari.
10. 1-va 2-ajoyib limitlar.
11. Funksiya hosilasi.
12. Hosilaning ta’rifi.
13. Hosila hisoblash qoidalari.
14. Elementar funksiyalarning hosilalari jadvali.
15. Funksiya ko‘paytmasining va bo‘linmasining hosilasi.
16. Murakkab funksiyaning hosilasi.
17. Hosilaning mexanik manosi.
18. Funksiyaning yuqori tartibli hosilalari.
19. Funksiya defferensial.
20. Defferensial hisobning asosiy teoremlari.
21. Aniqmas integral .
22. Aniqmas integralning xossalari.
23. Elementar funksiyalarning aniqmas integrallari jadvali.
24. Aniqmas integrallarni bo‘laklab integrallash usuli.
25. Aniqmas integrallarda o‘zgaruvchilarni almashtirib integrallash usuli.
26. Rastional funksiyalarni integrallash.

27. Aniq integral va uning tatbiqlari
28. Birinchi tur xosmas integrallarning yaqinlashuvchiligi
29. Ikkinchi tur xosmas integrallarning yaqinlashuvchiligi
30. Qatorlarni yaqinlashishga tekshirishda taqqoslash alomati (*taqqoslash alomati, teorema*)
31. Qatorlarni yaqinlashishga tekshirishda Dalamber alomati (*Dalamber alomati*)
32. Uzoqlashuvchi sonli qatorlar (*Uzoqlashuvchi sonli qatorlar*)
33. Qatorlarni yaqinlashishga tekshirishda Koshining ildiz alomati (*Koshining ildiz alomati*)
34. Qatorlarni yaqinlashishga tekshirishda Koshining integral alomati (*sonli qatorlar, Koshining integral alomati*)
35. Darajali qatorlar va ularning yaqinlashishi (Darajali qaror ta'rifi, yaqinlashish radiusi va sohasi)
36. Funktsional qatorlarni yaqinlashishga tekshirishda Abel teoremasi (*yaqinlashish radiusi, yaqinlashish sohasi*)
37. Kompleks sonlar, ularning turli ko'rinishlari
38. $y = \frac{2}{\sqrt{x-5}} + \lg(x-2)$ funksiya aniqlanish sohasini toping.
39. $y = \sqrt{\frac{x^2-1}{x^2+1}}$ funksiya aniqlanish sohasini toping.
40. $y = \arcsin(4-x) + \ln \sqrt{\frac{-x}{1-x}}$ funksiya aniqlanish sohasini toping.
41. $y = \frac{2}{\sqrt{x-5}} + \lg(x-2) + \frac{\sqrt{x-3}}{x-5}$ funksiya aniqlanish sohasini toping.
42. $y = \arccos(1-2x) + \sqrt{\frac{3-x}{1-x}} + \ln(-2x-1)$ funksiya aniqlanish sohasini toping.
43. $y = 2^x + 2^{-x} + x^2$ funksiyaning qiymatlar sohasini toping.
44. $y = 2 \cos x - 3$ funksiyaning qiymatlar sohasini toping.
45. $y = \sqrt{7-x} + 2$ funksiyaning qiymatlar sohasini toping.
46. $y = 2e^{-x^2} + 1$ funksiyaning qiymatlar sohasini toping.

47. $y = \frac{1}{\sqrt{2x^2 - 4x + 3}}$ funksiyaning qiymatlar sohasini toping.

48. $y = \frac{x-1}{x}$ funksiya hosilasini toping.

49. $y = x^2 + \cos x$ funksiya hosilasini toping.

50. $f(x) = 2x^2 \sin x^3$ funksiya hosilasini toping.

51. $y = x^3 e^{\operatorname{ctg} 3x}$ funksiyaning hosilasini toping.

52. $y = x^{x^x}$ funksiyaning hosilasini toping.

53. $y = e^{\sin^2(x+\sqrt{x})} \ln(x-1)$ funksiya hosilasini toping.

54. $y = (\sin 2x)^{\cos 4x}$ funksiyaning hosilasini toping.

55. $y = x^{\frac{1}{\ln x}}$ funksiya hosilasini toping.

56. $y = \ln^2(x^4 + 5x^2 + 8)$ funksiya hosilasini toping.

57. $y = \sqrt{1-x^2} + \arcsin x$ funksiya hosilasini toping.

58. $y = x\sqrt{1-x^2} + \arccos x$ funksiya hosilasini toping.

59. $y = x \arctg x + \ln \sqrt{\frac{1+x}{1-x}}$ funksiya hosilasini toping.

60. Funksiyaning hosilasini toping. $y = x^{\sin 2x}$

61. $y = x - \arctg x$ funksiyaning ikkinchi tartibli hosilasini toping.

62. Quyidagi funksiylarning 2-tartibli hosilalari topilsin

$$y = \arctg \frac{x}{a}; \quad y = \arccos(1-2x)$$

63. $f(x) = 2^{\frac{x}{4-x}}$, $x = 4$ nuqtada berilgan funksiyaning o'ng va chap limitlarini hisoblang.

64. $f(x) = [x]$, $x = 3$ nuqtada berilgan funksiyaning o'ng va chap limitlarini hisoblang.

65. Quyidagi limitni hisoblang: $\lim_{x \rightarrow 0} \frac{1 - \cos^2 x}{3x^2}$.

66. Quyidagi limitni hisoblang: $\lim_{x \rightarrow \infty} (\sqrt{x^2 + 9} - x)$.

67. $\lim_{n \rightarrow \infty} \frac{n! + (n+2)!}{(n-1)! + (n+2)!}$ limitni toping.

68. $\lim_{n \rightarrow \infty} \frac{3+6+9+\dots+3n}{n^2+4}$ funksiya limitini hisoblang.

69. Quyidagi limitni hisoblang: $\lim_{x \rightarrow \infty} \left(1 + \frac{6}{x^2}\right)^{x(x+1)}$.

70. Quyidagi limitni hisoblang: $\lim_{x \rightarrow 0} \frac{\sqrt{1+\sin x} - \sqrt{1-\sin x}}{\operatorname{tg} x}$.

71. Quyidagi limitni hisoblang: $\lim_{x \rightarrow 0} \left(\frac{2-x}{2+x}\right)^{\frac{3}{x}}$

72. Funksiya limitini hisoblang. $\lim_{x \rightarrow \infty} \left(\frac{2x+1}{2x-3}\right)^{4x-1}$

73. Quyidagi limitni hisoblang: $\lim_{x \rightarrow 25} \frac{\sin(\sqrt{x}-5)}{x-25}$

74. Quyidagi limitni hisoblang: $\lim_{n \rightarrow \infty} \left(\frac{n-4}{n}\right)^{n+1}$

75. Limitni toping: a) $\lim_{x \rightarrow 3} \frac{x^2 - x - 6}{3 - x}$;

76. Quyidagi limitni hisoblang: $\lim_{x \rightarrow 1} \frac{x^{50}-1}{x^{25}-1}$.

77. Limitni toping. a) $\lim_{n \rightarrow \infty} \frac{(2n+1)! + (2n+2)!}{(2n+3)! - (2n+2)!}$;

78. Integralni toping. $\int \sin^3 x \operatorname{tg}^2 x dx$.

79. $\int \frac{dx}{x(1+\ln^2 x)}$ Integralni hisoblang.

80. $\int \frac{3x^2 - 4x}{x^3 - 2x^2 + 4} dx$ aniqmas integralni hisoblang.

81. $\int \frac{dx}{\sin^2 x \cos^2 x}$ integralni hisoblang.

82. Aniqmas integralni hisoblang $\int 3xe^{3x} dx$

83. $\int \frac{\cos 2x}{\cos^2 x \sin^2 x} dx$ integralni hisoblang.

84. $\int tg^2 x dx$ integralni hisoblang.

85. $\int \left(\frac{2}{\sqrt{1-x^2}} + \frac{3}{x^2+1} \right) dx$ integralni hisoblang.

86. $\int x^2 \sqrt{x^3-5} dx$ integralni hisoblang.

87. $\int_0^{\frac{\pi}{4}} tgx \cdot \ln \cos x dx$ integralni hisoblang.

88. $\int_1^e \frac{(\ln x)^2}{x} dx$ integralni hisoblang

89. $\int_{e+1}^{e^2+1} \frac{1+\ln(x-1)}{x-1} dx$ integralni hisoblang

90. $\int_0^{\frac{\pi}{6}} \cos^3 x \sqrt{\sin x} dx$ integralni hisoblang

91. $\int_1^3 x \sqrt{(1+2x)} dx$ integralni hisoblang.

92. $\int_3^6 \sqrt{1+2x} dx$ integralni hisoblang.

93. $\int_0^1 \frac{x dx}{x^4+1}$ integralni hisoblang

94. $\int_0^1 x^2 e^{-2x^3} dx$ integralni hisoblang

95. $\int_0^{+\infty} \frac{dx}{1+x^2}$ xosmas integralni yaqinlashishga tekshiring.

96. $\int_1^{+\infty} \frac{\ln x}{x} dx$ integralni hisoblang va yaqinlashuvchi yoki uzoqlashuvchi ekanligini ko'rsating

97. $\int_1^{+\infty} \frac{x^3+1}{x^4} dx$ integralni yaqinlashishga tekshiring

98. Qatorlarni yaqinlashishga Dalamber alomati bilan tekshiring: $\sum_{n=1}^{\infty} \frac{n^n}{n!}$

99. Qatorni yaqinlashishga tekshiring va yig'indisini toping. $\sum_{n=1}^{\infty} \frac{1}{9n^2+3n-2}$

100. Qatorni yaqinlashishga tekshiring va yig'indisini toping. $\sum_{n=1}^{\infty} \frac{1}{4n^2+4n-3}$

101. Qatorlarni yaqinlashishga tekshiring: $\sum_{n=1}^{\infty} \left(\frac{4n-1}{4n} \right)^{n^2}$

102. Darajali qatorni yaqinlashish radiusi va yaqinlashish oralig'ini toping:

$$\sum_{n=1}^{\infty} \frac{1}{5^n} x^n$$

103. Qator yig'indisini toping $\sum_{n=1}^{\infty} \frac{1}{(3n-2)(3n+1)}$.

104. Qator yig'indisini toping. $\sum_{n=1}^{\infty}(\sqrt{n+2} - 2\sqrt{n+1} + \sqrt{n})$.
105. Qator yig'indisini toping. $\sum_{n=1}^{\infty}(\frac{1}{2^n} + \frac{1}{3^n})$
106. Qatorni yaqinlashuvchilikka tekshiring: $\sum_{n=1}^{\infty} \frac{1}{n^2+8}$;
107. Qatorni yaqinlashuvchilikka tekshiring: $\sum_{n=1}^{\infty} \frac{2^n n!}{n^n}$;
108. Qatorni yaqinlashuvchilikka tekshiring: $\sum_{n=1}^{\infty} \frac{(2n+1)!}{(3n+4)3^n}$
109. Qatorni yaqinlashish radiusi va oralig'ini toping: $\sum_{n=0}^{\infty} 3^n (x+1)^n$.
110. Qatorni yaqinlashish radiusi va oralig'ini toping: $\sum_{n=1}^{\infty} \frac{x^n}{n^2}$;
111. Darajali qatorning yaqinlashish radiusini toping. $\sum_{n=0}^{\infty} \frac{2^n}{n!} x^n$
112. Darajali qatorning yaqinlashish radiusini toping. $\sum_{n=0}^{\infty} \frac{3^n}{n!} x^n$
113. Darajali qatorning yaqinlashish radiusini toping. $\sum_{n=0}^{\infty} \frac{(2n-1)!!}{(2n)!!} x^n$

Mustaqil ta'lim mavzulari yuzasidan savollar:

1. Sonlar ketma-ketligi va uning limiti.
2. Kamayuvchi bo'lib quyidan chegaralangan va o'suvchi bo'lib yuqoridan chegaralangan ketma-ketliklarga misol keltiring.
3. Chegaralanmagan ketma-ketliklar.
4. Chegaralangan va monoton ketma-ketliklar.
5. Funksiya tushunchasi va uning berilish usullari.
6. Funksiyaning aniqlanish va qiymatlar sohasi.
7. Funksiyaning monotonligi.
8. Juft va toq funksiyalar.

9. O'suvchi bo'lib yuqoridan chegaralangan va kamayuvchi bo'lib quyidan chegaralangan funksiyalarga misol keltiring
10. Roll teoremasi (hosilaning noli haqida)
11. Lagranj teoremasi (chekli orttirmalar haqidagi teorema)
12. Parametr orqali beriladigan funksiyalar va ularning hosilalari.
13. O'suvchi bo'lib yuqoridan chegaralangan va kamayuvchi bo'lib quyidan chegaralangan funksiyalarga misol keltiring
14. Aniq integral va uning xossalari (aniq integral, aniq integralning xossalari)
15. Aniq integralning geometrik manosi (*Aniq integralning geometrik manosi*)
16. Aniq integralda o'zgaruvchilarni almashtirib hisoblash (*o'zgaruvchilarni almashtirib integrallash*)
17. Integral hisobning asosiy teoremasi (*Integral hisobning asosiy teoremasi, Nyuton-Leybnits teoremasi*)
18. Aniq integralni bo'laklab integrallash (*bo'laklab integrallash, teorema*)
19. Birinchi tur xosmas integrallar (*xosmas integrallar, Birinchi tur xosmas integrallar, teorema*)
20. Ikkinchi tur xosmas integrallar (*Ikkinchi tur xosmas integrallar haqidagi teorema*)
21. Ikkinchi tur xosmas integrallarning yaqinlashish alomati (*ikkinchi tur xosmas integrallar, teoremlar*)
22. Ishora almashuvchi qatorlar va ularning yaqinlashuvchanligi.
23. Qator yaqinlashishining zaruriy va yetarli alomati (*sonli qatorlar, Koshi kriteriyasi*)
24. Yaqinlashuvchi sonli qatorlar (*sonli qatorlar, yaqinlashuvchi sonli qatorlar, yaqinlashuvchi sonli qatorlarning yig'indisi*)

Misollar.

25. Quyidagi limitni Lopital qoidasiga asosan hisoblang: $\lim_{x \rightarrow 0} \lg x \cdot \ln x$.

26. $\lim_{x \rightarrow -1} (1 - 3x) = 4$ ekanligini limit ta'rifi yordamida ko'rsating.

27. $\lim_{x \rightarrow 1} (5x^2 - 3) = 2$ ekanligini limit ta'rifi yordamida ko'rsating.

28. $\lim_{n \rightarrow \infty} (4 + \frac{3}{n}) = 4$ ekanligini limit ta'rifi yordamida ko'rsating.

29. $f(x) = 3^{\frac{1}{x-1}}$ funksiyaning uzilish nuqtalarining turini aniqlang.

30. $y = \sin x$ funksiya hosilasini hosila ta'rifiga asosan toping.

31. $y = \operatorname{ctg} 2x$ funksiya hosilasini hosila ta'rifiga asosan, toping.

32. $f(x) = 2x^2$ funksiya hosilasini hosila ta'rifiga asosan, toping.

33. $y = e^x$ funksiya hosilasini hosila ta'rifiga asosan, toping.

34. $y = (x^2 + 1)^{\operatorname{ctg} 2x}$ funksiyaning differensialini toping.

35. $y = x^5 e^x$ funksiyaning ikkinchi tartibli hosilasini toping.

36. $\int x e^{4-5x^2} dx$ Integralni hisoblang .

37. $\int \left(\frac{1}{x^2 + 3} + \frac{1}{\sqrt{4 - x^2}} \right) dx$ integralni hisoblang.

38. $\int \frac{1 + 2x^2}{x^2(1 + x^2)} dx$ aniqmas integralni hisoblang.

39. $\int \frac{\cos x dx}{\sin^2 x - 4 \sin x + 5}$. Integralni toping.

40. Integralni hisoblang $\int \frac{\sqrt{\operatorname{ctg} 7x}}{\sin^2 7x} dx$.

41. Aniqmas integralni toping. $\int \frac{e^{3x}}{4 - e^{6x}} dx$.

42. $\int \frac{\sin 3x}{\cos^2 3x} dx$ aniqmas integralni hisoblang.

43. $\int e^x \sin x dx$ aniqmas integralni hisoblang.

44. Aniqmas integralni hisoblang. $\int x^2 \cos 2x dx$

45. Lopital qoidasidan foydalanmasdan limitni hisoblang: $\lim_{x \rightarrow 0} \frac{\sqrt[3]{27+x} - \sqrt[3]{27-x}}{\sqrt[3]{8+x} - \sqrt[3]{8-x}}$

46. $\int (5e^x + \sqrt[3]{x^2}) dx$ integralni hisoblang.

47. $\int \frac{(x^2-1)^2}{x} dx$ integralni hisoblang.

48. Ushbu $f(x) = \sin x$ funksiya uchun $[0; 2\pi]$ segmentda Roll teoremasining shartlari bajariladimi?

49. $f(x) = e^x$ funksiya $[0; 2\pi]$ segmentda Koshi teoremasining shartlarini qanoatlantiradimi?

50. $g(x) = \frac{x^2}{1+x^2}$ funksiya $[0; 2\pi]$ segmentda Koshi teoremasining shartlarini qanoatlantiradimi?

51. $f(x) = x(x^2 - 1)$ funksiya uchun $[0, 1]$ segmentda Roll teoremasining shartlarini tekshiring.

52. $f(x) = \begin{cases} x \sin \frac{1}{x}, & \text{agar } x \neq 0 \text{ bo'lsa,} \\ 0, & \text{garr } x = 0 \text{ bo'lsa} \end{cases}$ funksiya uchun $[-1; 1]$ oraliqda Lagranj teoremasi o'rinlimi?

53. $[1; 4]$ segmentda $f(x) = \sqrt{x}$ funksiya uchun Lagranj formulasi yozilsin va c topilsin.

54. $f(x) = x^3$ va $g(x) = x^2$ funksiyalar uchun Koshining $\frac{f(b)-f(a)}{g(b)-g(a)} = \frac{f'(c)}{g'(c)}$ formulasi yozilsin hamda c topilsin.

55. $f(x) = x^3$ funksiya uchun Lagranjning $f(b) - f(a) = (b-a)f'(c)$ formulasi yozilsin va c topilsin.

56. $y = x^2(1-x)$ funksiyaning ekstremumlarini toping.

57. $f(x) = \frac{1}{1-x^2}$ funksiyalar grafiglarining qavariqlik va botiqlik oraliqlarini hamda egilish nuqtalarini toping.

58. $y = 2 + \frac{12}{x^2 - 4}$ funksiyalar grafiglarining qavariqlik va botiqlik oraliqlarini hamda egilish nuqtalarini toping.

59. $y = \frac{1}{1+x^2}$ funksiyaning ekstremumlarini toping.

60. $y = \frac{x}{2} + \frac{2}{x}$ funksiyaning ekstremumlarini toping.

61. $\int_0^{\frac{\pi}{4}} e^x \sin 2x dx$ integralni hisoblang

62. $\int_e^{e^2} \frac{\ln^3 x + 3}{x \ln x} dx$ integralni hisoblang.

63. $\int_0^1 \arcsin x dx$ integralni hisoblang.

64. $\int_0^1 \frac{e^{3x}}{\sqrt{16+e^{6x}}} dx$ integralni hisoblang.

65. $\int_0^{\ln 2} \frac{dx}{e^x(3+e^{-x})} dx$ integralni hisoblang.

66. $\int_0^{\frac{\pi}{4}} e^x \cos x dx$ integralni hisoblang.

67. $\int_0^{\infty} e^{-x} \cos x dx$ xosmas integralni hisoblang.

68. $\int_0^{+\infty} \frac{\sin x}{e^{2x}} dx$ xosmas integralni yaqinlashishga tekshiring.

69. Qatorlarni yaqinlashishga Koshining integral alomati bilan tekshiring:

$$\sum_{n=1}^{\infty} \frac{n+2}{n^3 \sqrt[n]{n}}$$

70. Sonli qatorning yaqinlashishini tekshiring: $\sum_{n=1}^{\infty} \frac{2n+1}{n^2+5}$

71. Darajali qatorni yaqinlashish radiusi va yaqinlashish oralig'ini toping:

$$\sum_{n=1}^{\infty} \left(-\frac{2}{3}\right)^n x^n.$$

72. Qatorni yaqinlashuvchilikka tekshiring: $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n}$.

73. Qatorni yaqinlashuvchilikka tekshiring: $\sum_{n=1}^{\infty} \frac{(2n+1)!}{(3n+4)3^n}$.

74. Qatorni yaqinlashuvchilikka tekshiring: $\sum_{n=1}^{\infty} \left(\frac{n^2+1}{n^2+2}\right)^{n^3}$,

75. Qatorni yaqinlashuvchilikka tekshiring: $\sum_{n=1}^{\infty} 2^n \left(\frac{n}{n+1}\right)^{n^2}$.

76. Qatorni yaqinlashuvchilikka tekshiring: $\sum_{n=1}^{\infty} \frac{n^2}{\left(2+\frac{1}{n}\right)^n}$.

77. Qatorni yaqinlashuvchilikka tekshiring: $\sum_{n=2}^{\infty} \frac{1}{n \sqrt[n]{\ln n}}$.

78. Darajali qatorning yaqinlashish radiusini toping. $\sum_{n=1}^{\infty} \frac{x^n}{n^2}$.

79. Darajali qatorning yaqinlashish radiusini toping: $\sum_{n=0}^{\infty} \frac{x^n}{n!}$