

Matematika ta'lim yo'nalishi 1-kurs talabalari uchun "*Matematik analiz*" fanidan
yakuniy nazorat savollari
(2024-2025 o'y. 1-semestr)

Nazariy savollar

1. Sonli ketma-ketlik va uning limiti.
2. Yaqinlashuvchi va uzoqlashuvchi ketma-ketlik ta'riflari.
3. Funksiyani monotonlikga tekshirish.
4. Yuqori tartibli hosilalarni hisoblashning Leybnis formulasi.
5. Yaqinlashuvchi ketma-ketlik xossalari.
6. Differensial hisobning asosiy teoremlarining biri, Koshi teoremasi.
7. Cheksiz kishik ketma-ketliklar va ularning xossalari.
8. Differensial hisobning asosiy teoremlarining biri, Ferma teoremasi.
9. Cheksiz katta ketma-ketliklar va ularning xossalari.
10. Differensial hisobning asosiy teoremlarining biri, Roll teoremasi.
11. Cheksiz kishik va cheksiz katta ketma-ketliklar orasidagi bog'liqlik.
12. Differensial hisobning asosiy teoremlarining biri, Lagranj teoremasi.
13. Monoton ketma-ketliklar va ularning limiti.
14. Yuqori tartibli hosila va differensiallar.
15. Monoton ketma-ketliklar haqida Veyershtrass teoremasi.
16. Funksiya grafigining asimptotalari.
17. Fundamental ketma-ketliklar va Koshi teoremasi.
18. Cheksiz katta va cheksiz kishik funksiyalar. Funksiyalarni taqqoslash.
19. Qisman ketma-ketliklar. Ketma-ketlikning yuqori va quyi limitlari.
20. Differensial yordamida taqribiy hisoblash.
21. Funksiya tu'shunchasi. Juft, toq, davriy, teskari va murakkab funksiyalar.
22. Bir o'zgaruvchili funksiya uchun Teylor va Makloren formulalari.
23. Funksiya limitining Koshi, Geyne ta'riflari va ularning ekvivalentligi.
24. Funksiyani ekstremumga tekshirish.
25. Funksiyaning bir tomonlama limitlari.
26. Differensiallanuvchi va u'zluksiz funksiyalar orasidagi bog'liqlik.
27. Limitga ega bo'lgan funksiyalarning xossalari.
28. Murakkab funksiyaning hosilasi.
29. Funksiyaning nuqtada u'zluksizligi va u'zilishi.
30. Teskari funksiyaning hosilasi.
31. Funksiyaning nuqtada bir tomonlama u'zluksizligi.
32. Parametrik ko'rinishda berilgan funksiyaning hosilasi.
33. Nuqtada u'zluksiz funksiyalarning xossalari.
34. Oshkormas ko'rinishda berilgan funksiyaning hosilasi.
35. Kesmada u'zluksiz funksiyalarni xossalari.
36. Bir tomonlama hosilalar.
37. Funksiyaning tekis u'zluksizligi. Kantor teoremasi.
38. Urinma va normal tenglamalari.
39. U'zluksiz funksiyalarning xossalari.
40. Funksiya hosilasi va differensial.
41. Uzilish nuqtalari va ularning tu'rlari.
42. Hosilaning geometrik ma'nosi
43. Aniqmasliklarni ochish. Lopital qoidalari.
44. Funksiya grafigining botiqligi, qavariqligi va egilish nuqtalari.

Amaliy masalalar

45. $y = \frac{2x^2 - 9}{\sqrt{x^2 - 1}}$ funksiyaning asimptotalarini toping.
46. $\begin{cases} x = \sqrt{t} - 1 \\ y = \frac{1}{\sqrt{t}} \end{cases}$ parametr bilan berilgan funksiyaning 2-tartibli hosilasini toping ($y''(x) = ?$)
47. $x_n = \frac{a^n + b^n}{5a^n + 7b^n}$, ($a > 0$, $b > 0$) ketma-ketlik limitini hisoblang.
48. $\ln(1+x) \geq x - \frac{x^2}{2}$, $x \geq 0$ tengsizlikni isbotlang.
49. $f(x) = \sin 5x \cdot (1 + 2x - 3x^2)$, $f^{(150)}(0) = ?$
50. $x_n = n^{(-1)^n}$, $\overline{\lim}_{n \rightarrow \infty} x_n = ?$, $\underline{\lim}_{n \rightarrow \infty} x_n = ?$
51. $\lim_{x \rightarrow 0} (x^{-2} - \sin^{-2} x)$ limitni toping.
52. $y = (2x - 1)^2 (2x - 3)^2$ funksiyaning grafigini chizing.
53. $f(x) = \arcsin x + \sqrt{\frac{2}{nx - 1}}$ funksiyaning aniqlanish sohasini toping, bunda $n \in \mathbb{N}$
54. $M(p; p)$ nuqta va $y^2 = 2px$ parabola orasidagi eng qisqa oraliqni toping.
55. $f(x) = e^x \cdot (1 - x^3)$, $f^{(100)}(x) = ?$
56. $f(x) = \frac{1}{x - 5}$, $x \in [0, 5]$ berilgan funksiyaning ko'rsatilgan oraliqta chegaralangan ekanligini ko'rsating.
57. $y = \frac{4x + 7}{2x + 3}$, $y^{(n)}(x) = ?$
58. $x_n = n(\sqrt[3]{5 + 8n^3} - 2n)$, $\lim_{n \rightarrow \infty} x_n = ?$
59. $f(x) = [3x + 4] - 3x$ funksiyaning davrini toping, bunda $[]$ -sonning butun bo'lagi.
60. $\begin{cases} x = \sqrt{t^3 - 1} \\ y = \ln t \end{cases}$ parameter bilan berilgan funksiyaning 2-tartibli hosilasini toping ($y''(x) = ?$)
61. $x_n = \left(\frac{n+1}{n}\right)^n (-1)^n + \sin \frac{\pi n}{2}$, $\overline{\lim}_{n \rightarrow \infty} x_n = ?$, $\underline{\lim}_{n \rightarrow \infty} x_n = ?$
62. $f(x) = \sin x$, $x \in \left[-10; -\frac{11}{4}\pi\right]$ berilgan funksiyaning korsatilgan oraliqdagi teskari funsiyasini toping.
63. $y = \sqrt{x^2 + 5}$; $x = 1,97$ differensial yordamida ifodaning taqribiy qiymatini hisoblang.
64. $\lim_{x \rightarrow 8} \left(\frac{2x - 7}{x + 1}\right)^{\frac{1}{\sqrt[3]{x} - 2}}$ limitni toping (Lopital qoidasidan foydalanmang!).
65. Qanday nuqtalarda $f(x) = \frac{1}{3}\sin 3x + \frac{\sqrt{3}}{3}\cos 3x$ funksiya grafigiga o'tkazilgan urinma $y = -x$ tog'ri chiziqqa parallel bo'ladi.
66. $y = x^{\arcsin x}$ funksiya hosilasini toping.

67. $f(x) = \frac{2(1-x^2) + |1-x^2|}{3(1-x^2) - |1-x^2|}$ $x_0 = 1$, $f(x+0) - ?$, $f(x-0) - ?$

68. $\lim_{x \rightarrow 1} \frac{\sqrt[m]{x} - 1}{\sqrt[n]{x} - 1}$, $(n, m \in \mathbb{R})$ limitni toping.

69. $y = \frac{4+3x^3}{x^3\sqrt{(2+x^3)^2}}$ funksiyaning hosilasini toping.

70. a ning qanday qiymatlarida $y = \begin{cases} \cos x, & x \leq 0 \\ a(x-1), & x > 0 \end{cases}$ funksiya u'zluksiz bo'ladi.

71. Qanday nuqtalarda $f(x) = -\sqrt{2x^3}$ funksiya grafigiga o'tkazilgan urinma $4x - 3y + 2 = 0$ to'g'ri chiziqqa perpendikulyar bo'ladi.

72. $y = \frac{x}{x^2 + 1}$, $x_0 = -2$ berilgan funksiya grafigiga ko'rsatilgan nuqtada o'tkazilgan urinma va normal tenglamalarini toping.

73. $\lim_{x \rightarrow 1} \frac{\sqrt{x^2 - x + 1} - 1}{\tan \pi x}$ limitni toping (Lopital qoidasidan foydalanmang!).

74. $f(x) = 5|x+1|$, $x_0 = -2$ berilgan funksiyaning ko'rsatilgan nuqtadagi hosilasini ta'rif yordamida hisoblang.

75. $f(x) = \frac{\cos x}{3 - 2^{\frac{1}{\sin x}}}$, $x_0 = 0$ $f(x+0) - ?$, $f(x-0) - ?$

76. $f(x) = \ln(1-x) \cdot (1+x-x^2)$, $f^{(200)}(x) = ?$

77. $f(x) = \sqrt[3]{x}$, $(x > 0)$ funksiya differensialini hisoblang.

78. $f(x) = \frac{x}{4-x^2}$, $-1 \leq x \leq 1$ berilgan funksiyaning ko'rsatilgan oraliqda tekis u'zluksizlikga tekshiring.

79. $f(x) = e^{3x} \cdot (1-2x-x^2)$, $f^{(n)}(x) = ?$

80. $f(x) = \ln \cos x$ funksiyaning Makloren formulasi bo'yicha $o(x^2)$ hadgacha yoying.

81. Agar $f(x) = \begin{cases} x^2 \cdot \cos^2 \frac{11}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$ bo'lsa, $f'(0)$ ni toping.

82. $f(x) = \frac{x^5 + 1}{x^4 + 1}$, $x_0 = 1$ berilgan funksiya grafigiga ko'rsatilgan nuqtada o'tkazilgan urinma va normal tenglamalarini toping.

83. $f(x) = \ln \cos x$ funksiyaning ko'rsatilgan nuqtada $o((x-x_0)^2)$ hadgacha yoying.

84. $\lim_{x \rightarrow 2\pi} (\cos x)^{\frac{1}{\sin^2 2x}}$ limitni toping (Lopital qoidasidan foydalanmang!).

85. $y = 3\sqrt[3]{\frac{x+1}{(x-1)^2}}$, $y' = ?$

86. $f(x) = \ln(2x+1)$ funksiyaning Teylor formulasi bo'yicha $x_0 = \frac{1}{2}$ nuqta atrofida $o((x-x_0)^2)$ hadgacha yoying.

87. $\lim_{x \rightarrow 8} \frac{\sqrt{9+2x} - 5}{\sqrt[3]{x} - 2}$ limitni toping (Lopital qoidasidan foydalanmang!).

88. $y = (\arcsin 3x)e^{2x}$, $y' = ?$

89. $f(x) = e^{\lg x}$ funksiyani Makloren formulasi bo'yicha $o(x^2)$ hadgacha yoying.

90. $\lim_{x \rightarrow \frac{\pi}{4}} \frac{1 - \sin 2x}{(\pi - 4x)^2}$ limitni toping (Lopital qoidasidan foydalanmang!).

91. $\ln \frac{a}{b} > \frac{a-b}{a}$, $0 < b < a$ tengsizlikni isbotlang.

92. $f(x) = (x-1)^3(2x+3)^3$ funksiyani monotonlikga tekshiring.

93. $\lim_{x \rightarrow 2} \frac{3x^2 - 5x - 2}{x - 2} = 7$ ekanligini ta'rif boyicha isbotlang.

94. $y = \lg(2x+7)$, $y^{(n)}(x) = ?$

95. $f(x) = xe^{-x}$ funksiyani ekstremumga tekshiring.

96. $y = \sqrt{\frac{\sin x + \cos x}{\sin x - \cos x}}$ funksiyaning aniqlanish sohasi va qiymatlar to'plamini toping.

97. $\lim_{x \rightarrow 1} [(x-1)^{-1} - \ln^{-1} x]$ limitni hisoblang.

98. $f(x) = \frac{\sqrt{x}}{1+x}$ funksiya grafigining botiq va qavariq oraliqlarini toping.

99. $x_n = \frac{n+2}{n+1} \sin \frac{\pi n}{3}$, $\overline{\lim} x_n = ?$, $\underline{\lim} x_n = ?$

100. a musbat sonni shunday ikki qo'shiluvchiga ajrating, bu qo'shiluvchilarning kublarining yig'indisi eng kishik bo'lsin.

101. $f(x) = \frac{x}{\sqrt[3]{x^2-1}}$ funksiya grafigining egilish nuqtalarini toping.

102. $x_n = n + \sqrt[3]{4-n^2}$, $\lim_{n \rightarrow \infty} x_n = ?$

103. $f(x) = x^2(x-2)^2$ funksiya grafigini chizing.

104. $f(x) = \frac{1}{1-x^2}$ funksiya grafigining botiq va qavariq oraliqlarini toping.

105. Agar $x_n = \frac{2-3n^2}{4+5n^2}$, $a = -\frac{3}{5}$ bo'lsa, $\lim_{n \rightarrow \infty} x_n = a$ ekanligini ta'rif yordamida ko'sating.

106. $f(x) = \frac{x^2-3}{\sqrt{3x^2-2}}$ funksiyani monotonlikga tekshiring.

107. $\lim_{x \rightarrow 0} \frac{x \operatorname{ctg} x - 1}{x^2}$ limitni hisoblang.

108. Agar $x_n = \frac{2-3n^2}{4+5n^2}$, $a = -\frac{3}{5}$ bo'lsa, a soni $\{x_n\}$ ketma-ketlikning limiti emasligini ta'rif yordamida ko'sating.

109. $f(x) = \frac{x^2-3}{\sqrt{3x^2-2}}$ funksiyani ekstremumga tekshiring.

110. $f(x) = 4x^2 + \frac{1}{x}$ funksiya grafigining egilish nuqtalarini toping.

112. $x_n = \left(\frac{n^3+1}{n^3-1} \right)^{2n-n^3}$ ketma-ketlik limitin hisoblang.

113. $\operatorname{tg} \alpha \cdot \operatorname{tg} 2\alpha + \operatorname{tg} 2\alpha \cdot \operatorname{tg} 3\alpha + \dots + \operatorname{tg} (n-1)\alpha \cdot \operatorname{tg} n\alpha = \frac{\operatorname{tg} n\alpha}{\operatorname{tg} \alpha} - n$ tenglikni isbotlang.

114. $f(x) = \sin(2x+3)$ funksiyani Makloren formulasi bo'yicha $o(x^n)$ hadgacha yoying.

115. $x_n = \frac{\sqrt[3]{n+5} - \sqrt{3n^4+2}}{1+3+5+\dots+(2n-1)}$ ketma-ketlik limitini hisoblang.

116. Funksiya limitining ta'rifidan foydalanib, $\lim_{x \rightarrow 2} \frac{3x^2 - 5x - 2}{x - 2} = 7$ tenglikni isbotlang.

$f(x) = \begin{cases} x^3, & \text{agar } x \leq 0 \text{ bo'lsa} \\ e^{-\frac{1}{x}}, & \text{agar } x < 0 \text{ bo'lsa} \end{cases}$ funksiyaning $x_0 = 0$ nuqtadagi ong va chap tomonlama

hosilalarin toping

117. $x = \sin^2 t$, $y = \cos^2 t$, $0 < t < \frac{\pi}{2}$ parametrik ko'rinishda berilgan $y = y(x)$ funksiya uchun y'_x hosilasini toping.

118. $y = \ln(\ln^2(\ln^3 x))$ murakkab funksiyaning hosilasini toping.

119. $f(x) = \sqrt[3]{x}$ funksiyaning $X = [0; 2]$ to'plamda tekis uzluksiz ekanligini ko'rsating.

120. $f(x) = \frac{\sqrt{1 - \cos 2x}}{x}$ funksiyaning $a = 0$ nuqtada ong va chap limitlarini toping.

121. $f(x) = \left(\frac{a}{b}\right)^x \left(\frac{b}{x}\right)^a \left(\frac{x}{a}\right)^b$ ($a > 0, b > 0$) murakkab funksiyaning hosilasini toping.

122. $f_1(x) = x^2$ va $f_2(x) = x^3$ funksiya grafiklari qaysi nuqtalarda va qanday burchak ostida kesishadi?

123. $f(x) = x^2 - x + 1$ funksiyaning $X = (-3; 4)$ to'plamda tekis uzluksiz ekanligini ko'rsating.

124. $y = -\frac{\cos x}{2\sin^2 x} + \ln \sqrt{\frac{1 + \cos x}{\sin x}}$ murakkab funksiyaning hosilasini toping.

125. $f_1(x) = \ln x$ va $f_2(x) = \frac{x^2}{2e}$ funksiya grafiklari qaysi nuqtalarda va qanday burchak ostida kesishadi?

126. $y = \sin^2 x \cdot \sin 2x$, $y^{(n)}(x) = ?$

127. $e^{x-y} = x + y$ tenglama bilan berilgan oshkormas $y(x)$ funksiya uchun y''_{xx} ikkinchi tartibli hosilasini toping.

128. Hosila ta'rifidan foydalanib, $f(x) = 7 \operatorname{arctg}(x+1)$ funksiyaning hosilasini toping.

129. $\lim_{x \rightarrow \infty} \frac{\sqrt[3]{1 + \frac{4}{x}} - \sqrt[4]{1 + \frac{3}{x}}}{1 - \sqrt[5]{1 - \frac{5}{x}}}$ limitni hisoblang.

130. Hosila ta'rifidan foydalanib, $f(x) = \arccos 3x$ funksiyaning hosilasini toping.

131. $f(x) = x^{x^a} + x^{ax} + a^{x^x}$ ($a > 0, x > 0$) murakkab funksiyaning hosilasini toping.

132. $x_n = 1 + \frac{n}{n+1} \cdot \cos^2 \frac{n\pi}{2}$, $\overline{\lim} x_n = ?$, $\lim_{n \rightarrow \infty} x_n = ?$

133. $f(x) = \begin{cases} x^2, & \text{agar } x > 0 \text{ bo'lsa} \\ x^4, & \text{agar } x \leq 0 \text{ bo'lsa} \end{cases}$ funksiyaning $x_0 = 0$ nuqtadagi ong va chap tomonlama hosilalarin toping.

134. $f_1(x) = \frac{1}{x}$ va $f_2(x) = \sqrt{x}$ funksiya grafiklari qaysi nuqtalarda va qanday burchak ostida kesishadi?

135. Sonli ketma-ketlik ta'rifi bo'yisha $a = -3$ soni $x_n = \frac{1-3n^2}{n^2+2}$ ketma-ketlikning limiti ekanligini isbotlang.

136. $f(x) = \frac{1}{x-2}$ funksiyaning $X = [3; 4]$ to'plamda tekis uzluksiz ekanligini ko'rsating.

137. $f(x) = e^{5x-1}$ funksiyaning Makloren formulasi bo'yicha $O(x^n)$ hadgacha yoying.

138. $y = e^x + e^{e^x} + e^{ee^x}$ murakkab funksiyaning hosilasini toping.

139. $\lim_{x \rightarrow 1} \frac{x + x^2 + \dots + x^n - n}{x - 1}$, $n \in \mathbb{N}$ limitni hisoblang.

140. $E = \left\{ x = \frac{n}{1+n^2} : n \in \mathbb{N} \right\}$ to'plamning aniq yuqori chegarasi **SupE** va aniq quyi chegarasi **inf E** ni toping.

141. $f(x) = \begin{cases} (\pi + 2x) \operatorname{tg} x, & \text{eger } -\pi < x < \frac{\pi}{2}, x \neq -\frac{\pi}{2} \text{ bolsa} \\ A, & \text{eger } x = -\frac{\pi}{2} \text{ bolsa} \end{cases}$ funksiya A ning qanday

qiymatida $x = -\frac{\pi}{2}$ nuqtada uzluksiz bo'ladi?

142. $f(x) = \ln(1-x) \cdot (1+x-x^2)$, $f^{(120)}(x) = ?$

143. $\lg(n+1) > \frac{1}{n}(\lg 1 + \lg 2 + \dots + \lg n)$ tengsizlikni isbotlang.

144. $\frac{1}{2} \operatorname{tg} \frac{x}{2} + \frac{1}{2^2} \operatorname{tg} \frac{x}{2^2} + \dots + \frac{1}{2^n} \operatorname{tg} \frac{x}{2^n} = \frac{1}{2^n} \operatorname{ctg} \frac{x}{2^n} - \operatorname{ctg} x$ tenglikni isbotlang.

145. $f(x) = e^{6x} \cdot (1-2x-x^2)$, $f^{(n)}(x) = ?$

146. $f(x) = \cos\left(\frac{x}{2} + 2\right)$ funksiyaning Makloren formulasi bo'yicha $O(x^n)$ hadgacha yoying.

147. $f(x) = \begin{cases} \frac{(1+x)^n - 1}{x}, & \text{eger } x \neq 0 \text{ bolsa} \\ A, & \text{eger } x = 0 \text{ bolsa} \end{cases}$ funksiya A ning qanday qiymatida $x = 0$ nuqtada

uzluksiz bo'ladi?

148. $\lim_{x \rightarrow \frac{\pi}{2}} (\sin x)^{\operatorname{tg}^2 x}$ limitni hisoblang.
149. $f(x) = \frac{2x}{1-x^2}$ funksiyani Teylor formulasi bo'yicha $x_0 = 2$ nuqtaning atrofida $o((x-x_0)^2)$ hadgacha yoying.
150. $\operatorname{tg} n\alpha > n \operatorname{tg} \alpha$ tengsizlikni isbotlang, bunda $n \geq 2$.
151. Koshi kriteriyasidan foydalanib, $x_n = \frac{\sin \alpha}{2} + \frac{\sin 2\alpha}{2^2} + \dots + \frac{\sin n\alpha}{2^n}$ ketma-ketlikning yaqinlashuvchi ekanligini isbotlang.
152. $f(x) = \frac{2}{(1-x)^2}$ funksiyani Makloren formulasi bo'yicha $o(x^n)$ hadgacha yoying.
153. Sonli ketma-ketlik ta'rifi bo'yisha $a = \frac{4}{3}$ soni $x_n = \frac{4n^2+1}{3n^2+2}$ ketma-ketlikning limiti ekanligini isbotlang.
154. $y = \sin \left[\cos^2(\operatorname{tg}^3 x) \right]$ murakkab funksiyaning hosilasini toping.
155. $f(x) = 3^{2-x}$ funksiyani Makloren formulasi bo'yicha $o(x^n)$ hadgacha yoying.
156. $n^{n+1} > (n+1)^n$ tengsizlikni isbotlang, bunda $n \geq 3$.
157. $E = \{x = 1 - n^2 - 6n : n \in N\}$ to'plamning aniq yuqori chegarasi **SupE** va aniq quyi chegarasi **inf E** ni toping?
158. $f(x) = (x^2 - 1)e^{2x}$ funksiyani Teylor formulasi bo'yicha $x_0 = -1$ nuqtaning atrofida $o((x-x_0)^2)$ hadgacha yoying.
159. Sonli ketma-ketlik ta'rifi bo'yisha $a = 1$ soni $x_n = \frac{n}{\sqrt{n^2+n}}$ ketma-ketlikning limiti ekanligini isbotlang.
160. $x_n = \sqrt[n]{1+2^{n(-1)^n}}$, $\overline{\lim}_{n \rightarrow \infty} x_n = ?$, $\underline{\lim}_{n \rightarrow \infty} x_n = ?$
161. $x = t^2 + 6t + 5$, $y = \frac{t^3 - 54}{t}$, $0 < t < +\infty$ parametrik ko'rinishda berilgan $y = y(x)$ funksiya uchun y'_x hosilasini toping.
162. $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$ ($y > 0$) tenglama bilan berilgan oshkormas $y(x)$ funksiyaning hosilasini toping.
163. $y = \sin^4 x + \cos^4 x$, $y^{(n)}(x) = ?$
164. $f_1(x) = \sqrt{2} \sin x$ va $f_2(x) = \sqrt{2} \cos x$ funksiya grafiklari qaysi nuqtalarda va qanday burchak ostida kesishadi?
165. $f_1(x) = 4x^2 + 2x - 8$ va $f_2(x) = x^3 - x + 10$ funksiya grafiklari qaysi nuqtalarda va qanday burchak ostida kesishadi?

166. $f(x) = \sin\left(\frac{x}{2} + 2\right)$ funksiyani Makloren formulasi bo'yicha $O(x^n)$ hadgacha yoying.

167. $E = \left\{ x = \frac{(-1)^n \cdot n + 10}{\sqrt{n^2 + 1}} : n \in N \right\}$ to'plamning aniq yuqori chegarasi **SupE** va aniq quyi chegarasi **inf E** ni toping?

168. $E = \left\{ x = \frac{n}{a^n} : n \in N, a > 1 \right\}$ to'plamning aniq yuqori chegarasi **SupE** va aniq quyi chegarasi **inf E** ni toping?

169. $x_n = \frac{5}{6} + \frac{13}{36} + \dots + \frac{3^n + 2^n}{6^n}$ ketma-ketlik limitin toping.

170. $f(x) = (x^2 - x)e^{-x}$ funksiyani Makloren formulasi bo'yicha $O(x^n)$ hadgacha yoying.

171. Sonli ketma-ketlik ta'rif bo'yicha $a = 0$ soni $x_n = \frac{2^n}{n!}$ ketma-ketlikning limiti ekanligini isbotlang.

172. $x_n = n + \sqrt[3]{4 - n^2}$ ketma-ketlik limitin toping.

173. $f(x) = \ln \frac{1+2x}{1-x}$ funksiyani Makloren formulasi bo'yicha $O(x^n)$ hadgacha yoying.

174. Koshi kriteriyasidan foydalanib, $x_n = \frac{|\cos 1|}{3} + \frac{|\cos 2|}{3^2} + \dots + \frac{|\cos n|}{3^n}$ ketma-ketlikning yaqinlashuvchi ekanligini isbotlang.

175. $\lim_{x \rightarrow \pi} \frac{\sin x}{x^2 - x^2}$ limitni hisoblang.

176. $f(x) = \ln(2 + x - x^2)$ funksiyani Makloren formulasi bo'yicha $O(x^n)$ hadgacha yoying.

177. $x_n = \left(\frac{2n^2 + 21n - 7}{2n^2 + 18n + 9} \right)^{2n+1}$ ketma-ketlik limitin toping.

178. Koshi kriteriyasidan foydalanib, $x_n = \frac{1}{1 \cdot 2} - \frac{1}{2 \cdot 3} + \dots + \frac{(-1)^{n-1}}{n(n+1)}$ ketma-ketlikning yaqinlashuvchi ekanligini isbotlang.

179. $f(x) = \frac{2x+1}{x-1} \ln x$ funksiyani Teylor formulasi bo'yicha $x_0 = 1$ nuqtaning atrofida $o((x - x_0)^2)$ hadgacha yoying.

180. $5x^2 + 9y^2 - 30x + 18y + 9 = 0$ ($y < -1$) tenglama bilan berilgan oshkormas $y(x)$ funksiyaning hosilasini toping.

181. $y = x^2 \cdot \sin 2x$; $y^{(50)} = ?$

182. $x_n = \frac{n-1}{n+1} \cdot \cos \frac{2n\pi}{3}$, $\overline{\lim}_{n \rightarrow \infty} x_n = ?$, $\lim_{n \rightarrow \infty} x_n = ?$

183. Funksiya limitining ta'rifidan foydalanib, $\lim_{x \rightarrow 4} \frac{x^2 - 16}{x^2 - 4x} = 2$ tenglikni isbotlang.

184. $E = \left\{ x = \left[1 + (-1)^n \right] \cdot n + \frac{1 - (-1)^n}{n} : n \in N \right\}$ to'plamning aniq yuqori chegarasi **SupE** va

aniq quyi chegarasi **inf E** ni toping?

185. $y = (\sin x)^{\cos x} + (\cos x)^{\sin x}$ murakkab funksiyaning hosilasini toping. Sonli ketma-ketlik ta'rifi bo'yisha $a = 0$ soni $x_n = q^n$ ($|q| < 1$) ketma-ketlikning limiti ekanligini isbotlang.

186. $E = \left\{ x = 1 + \frac{(-1)^n}{n} : n \in N \right\}$ to'plamning aniq yuqori chegarasi **SupE** va aniq quyi

chegarasi **inf E** ni toping?

187. $f_1(x) = x^3$ va $f_2(x) = \frac{1}{x^2}$ funksiya grafiklari qaysi nuqtalarda va qanday burchak ostida kesishadi?

188. Funksiya limitining ta'rifidan foydalanib, $\lim_{x \rightarrow 4} \frac{x^2 - 16}{x - 4} = 8$ tenglikni isbotlang.

189. $x_n = \frac{(-1)^n}{n} + \frac{1 + (-1)^n}{2}$, $\overline{\lim}_{n \rightarrow \infty} x_n = ?$, $\lim_{n \rightarrow \infty} x_n = ?$

190. $x = e^{-t}$, $y = t^3$, $-\infty < t < +\infty$ parametrik ko'rinishda berilgan $y = y(x)$ funksiya uchun y'_x hosilasini toping

191. $f(x) = \begin{cases} x \cdot \cos \frac{1}{x}, & \text{eger } x \neq 0 \text{ bolsa} \\ 0, & \text{eger } x = 0 \text{ bolsa} \end{cases}$ funksiyaning $x_0 = 0$ nuqtadagi ong va chap

tomonlama hosilalarini toping.

$x = \ln \sin \frac{t}{2}$, $y = \ln \sin t$, $0 < t < \pi$ parametrik ko'rinishda berilgan $y = y(x)$ funksiya

192.

uchun y'_x hosilasini toping.

193. $y = x \cdot \operatorname{sh} x$; $y^{(100)} = ?$

194. $y = x \cdot \operatorname{sh} x$; $y^{(100)} = ?$

Sonli ketma-ketlik ta'rifi bo'yisha $a = 1$ soni $x_n = \sqrt[n]{2}$ ketma-ketlikning limiti ekanligini isbotlang.

196. $f(x) = x^{a^a} + a^{x^a} + a^{a^x}$ ($a > 0$) murakkab funksiyaning hosilasini toping.

197. $x = \operatorname{ctg} 2t$, $y = \frac{2 \cos 2t - 1}{2 \cos t}$, $0 < t < \frac{\pi}{2}$ parametrik ko'rinishda berilgan $x = x(y)$ funksiya uchun x'_y hosilasini toping.

198. $(4 - x)y^2 = x^3$ oshkormas ko'rinishda berilgan egri chiziqqa $M(x_0; y_0)$ nuqtada o'tkazilgan urinma va normal tenglamalarini toping

199. $f(x) = (x + 1)\sqrt{x^2 - 1}$ funksiyaning o'sish va kamayish oraliqlarini toping.

200. $y = \frac{x^2 - 3x + 2}{x^2 + 2x + 1}$ funksiyaning ekstremumlarini toping.

201. $2x^2 - 4xy + y^2 - 2x + 6y - 3 = 0$ egri chiziqqa o'tkazilgan va $(3; 4)$ nuqtadan o'tuvchi urinmalar orasidagi burchakni toping

202. Funksiya limitini ta'rifidan foydalanib, $\lim_{x \rightarrow -3} \frac{2x^2 + 5x - 3}{x + 3} = -7$ tenglikni isbotlang.

203. $f(x) = \frac{|x|}{x}$ funksiya $a = 0$ nuqtada limitga ega emasligini ko'rsating.

204. $\lim_{x \rightarrow 0} \frac{(\sqrt{1+x^2} + x)^n - (\sqrt{1+x^2} - x)^n}{x}$, $n \in \mathbb{N}$ limitni hisoblang

205. $y = \frac{1+x}{\sqrt{1-x}}$; $y^{(100)} = ?$

206. $e^{2y} - 2\ln(xy) - 1 = 0$ tenglama bilan berilgan oshkormas $y(x)$ funksiya uchun y''_{xx} ikkinchi tartibli hosilasini toping.

207. $3x^2 + 2xy + 2y^2 + 3x - 4y = 0$ ellipsning $(-2; 1)$ nuqtasiga yu'rgizilgan normal tenglamasini toping.

208. $y = \sqrt[3]{x^2} - 1$ funksiyaning $-\infty < x < +\infty$ oraliqtagi eng katta va eng kichik qiymatlarini toping, aga ular bor bo'lsa.

209. $\lim_{x \rightarrow 0} \frac{x}{\sqrt[n]{1+ax} \cdot \sqrt[m]{1+bx} - 1}$, $(n, m \in \mathbb{N})$ limitni hisoblang.

210. $4x^3 - 3xy^2 + 6x^2 - 5xy - 8y^2 + 9x + 14 = 0$ oshkormas ko'rinishda berilgan egri chiziqqa $M(-2; 3)$ nuqtada o'tkazilgan urinma va normal tenglamalarini toping.

211. $f(x) = \begin{cases} x \ln x^2, & \text{eger } x \neq 0 \text{ bolsa} \\ A, & \text{eger } x = 0 \text{ bolsa} \end{cases}$ funksiya A ning qanday qiymatida $x = 0$ nuqtada uzluksiz bo'ladi?

212. $x^2 - 4xy + 4y^2 + 4x - 3y - 7 = 0$ ($x < 2y - 1$) tenglama bilan berilgan oshkormas $y(x)$ funksiyaning hosilasini toping.

213. $f(x) = \frac{1}{x} \cdot e^{\frac{1}{x}}$, $E = \{0 < x < +\infty\}$, $\sup_{x \in E} f(x) = ?$, $\inf_{x \in E} f(x) = ?$

214. Sonli ketma-ketlik ta'rifi bo'yisha $a = 0$ soni $x_n = \frac{1}{\sqrt[3]{3n-11}}$ ketma-ketlikning limiti ekanligini isbotlang.

215. Sonli ketma-ketlik ta'rifi bo'yisha $a = 0$ soni $x_n = \frac{2}{\sqrt{2n-1}}$ ketma-ketlikning limiti ekanligini isbotlang.

216. $4x^3 - 3xy^2 + 6x^2 - 5xy - 8y^2 + 9x + 14 = 0$ oshkormas ko'rinishda berilgan egri chiziqqa $M(-2; 3)$ nuqtada o'tkazilgan urinma va normal tenglamalarini toping.

217. $y = \frac{x}{x^2 - 4x - 12}$, $y^{(n)}(x) = ?$

218. $x = \sqrt{2} \cos^3 t$, $y = \sqrt{2} \sin^3 t$ parametrik ko'rinishda berilgan funksiya grafigiga $M\left(\frac{1}{2}; \frac{1}{2}\right)$ nuqtada o'tkazilgan urinma va normal tenglamalarini toping.
219. $y = \frac{e^x}{x}$ funksiyaning ekstremumlarini toping.
220. Koshi kriteriyasidan foydalanib, $x_n = \sin 1 + \frac{\sin 2}{2^2} + \dots + \frac{\sin n}{n^2}$ ketma-ketlikning yaqinlashuvchi ekanligini isbotlang.
221. Koshi kriteriyasidan foydalanib, $x_n = 1 + \frac{1}{2^2} + \dots + \frac{1}{n^2}$ ketma-ketlikning yaqinlashuvchi ekanligini isbotlang.
222. $\lim_{x \rightarrow 1} \left(\frac{n}{1-x^n} - \frac{m}{1-x^m} \right)$, $(n, m \in \mathbb{N})$ limitni hisoblang
223. $f(x) = \sqrt{8x^2 - x^4}$ funksiyaning o'sish va kamayish oraliqlarini toping.
224. $f(x) = \left(1 + \frac{1}{x}\right)^x$ funksiyaning o'sish va kamayish oraliqlarini toping.
225. $f(x) = |\sin x|$ funksiyaning $x_0 = \pi$ nuqtadagi ong va chap tomonlama hosilalarini toping
225. $x_n = 1 + 2 \cdot (-1)^{n+1} + 3 \cdot (-1)^{\frac{n(n-1)}{2}}$, $\overline{\lim}_{n \rightarrow \infty} x_n = ?$, $\underline{\lim}_{n \rightarrow \infty} x_n = ?$
226. $x_n = \left(1 + \frac{1}{n}\right)^n (-1)^n + \sin \frac{n\pi}{4}$, $\overline{\lim}_{n \rightarrow \infty} x_n = ?$, $\underline{\lim}_{n \rightarrow \infty} x_n = ?$
227. Koshi kriteriyasidan foydalanib, $x_n = \frac{1}{1 \cdot 3} - \frac{1}{2 \cdot 4} + \dots + \frac{(-1)^{n-1}}{n(n+2)}$ ketma-ketlikning yaqinlashuvchi ekanligini isbotlang.
228. $f(x) = \frac{x^2 + 3e^x}{e^{2x}}$ funksiyaning Makloren formulasi bo'yicha $O(x^n)$ hadgacha yoying.
229. $f(x) = \frac{1}{x}$ funksiyaning Teylor formulasi bo'yicha $x_0 = 2$ nuqtaning atrofida $O((x - x_0)^2)$ hadgacha yoying.
230. Sonli ketma-ketlik ta'rif bo'yicha $a = -6$ soni $x_n = -\frac{6n}{n+2}$ ketma-ketlikning limiti ekanligini isbotlang
231. $\lim_{x \rightarrow 0} \frac{x \cdot \sin(\sin x) - \sin^2 x}{x^6}$ limitni hisoblang.
232. $\lim_{x \rightarrow a} \left(2 - \frac{x}{a}\right)^{\lg \frac{\pi x}{2a}}$ limitni hisoblang.
233. $f(x) = \frac{1+x^2}{1+x^4}$, $E = \{-\infty < x < +\infty\}$, $\sup_{x \in E} f(x) = ?$, $\inf_{x \in E} f(x) = ?$
234. Hosila ta'rifidan foydalanib, $f(x) = \frac{1}{1+x^2}$ funksiyaning hosilasini toping.

235. Hosila ta'rifidan foydalanib, $f(x) = x\sqrt[3]{x}$ funksiyaning hosilasini toping
236. $f(x) = \sin ax \cdot \sin bx$, $f^{(n)}(x) = ?$
237. $\lim_{x \rightarrow \infty} \frac{e^{-ax}}{e^{-x}(2 - \sin x - \cos x)}$ ($a \neq 1$) limitni hisoblang.
238. $f(x) = \begin{cases} \frac{\sin x}{x}, & \text{eger } x > 0 \text{ bolsa} \\ \cos x, & \text{eger } x \leq 0 \text{ bolsa} \end{cases}$ funksiyaning $a = 0$ nuqtada ong va chap limitlarini toping
239. $y = \frac{\sqrt{x}}{1+x}$ funksiya grafigining botiq va qavariq oraliqlarini toping.
240. $y^5 + y^3 + y - x = 0$ tenglama bilan berilgan oshkormas $y(x)$ funksiyaning hosilasini toping.
241. Koshi kriteriyasidan foydalanib, $x_n = \frac{\cos 1!}{1 \cdot 2} + \frac{\cos 2!}{2 \cdot 3} + \dots + \frac{\cos n!}{n \cdot (n+1)}$ ketma-ketlikning yaqinlashuvchi ekanligini isbotlang.
242. $y = \frac{\ln x}{\sqrt{x}}$ funksiya grafiginiń egilish nuqtalarini toping.
243. $\lim_{x \rightarrow 0} \left(\frac{2}{\pi} \cdot \arccos x \right)^{\frac{1}{x}}$ limitni hisoblang.
244. $\lim_{x \rightarrow \infty} \frac{x - \sin x}{x + \sin x}$ limitni hisoblang.
245. $y = x \sin \frac{1}{x}$ funksiya grafigining asimptotalarini toping.
246. $f(x) = \frac{1}{x^2 + 1}$, $E = \{-\infty < x < +\infty\}$, $\sup_{x \in E} f(x) = ?$, $\inf_{x \in E} f(x) = ?$
247. $y = \sqrt[3]{(x^2 - 2x)^2}$ funksiyaning $0 \leq x < 3$ oraliqdagi eng katta va eng kichik qiymatlarini toping, agar ular bor bo'lsa.
248. $y = x - \ln(1+x)$ funksiyaning ekstremumlarini toping.
249. $x = \frac{2t-1}{t^2}$, $y = \frac{3t^2-1}{t^3}$ parametrik ko'rinishda berilgan funksiya grafigiga $M(1;2)$ nuqtada o'tkazilgan urinma va normal tenglamalarini toping.
250. $f(x) = \arctg x - \ln x$ funksiyaning o'sish va kamayish oraliqlarini toping
251. $y = \arctg \frac{1-x}{1+x}$ funksiyaning $0 \leq x \leq 1$ kesmadagi eng katta va eng kichik qiymatlarini toping
252. $x = (t-1)^2(t-2)$, $y = (t-1)^2(t-3)$, $\frac{5}{3} < t < +\infty$ parametrik ko'rinishda berilgan $y = y(x)$ funksiya uchun y'_x hosilasini toping
253. $x = (t^3 - 2t^2 + 3t - 4)e^t$, $y = (t^3 - 2t^2 + 4t - 4)e^t$, $1 < t < +\infty$ parametrik ko'rinishda berilgan $x = x(y)$ funksiya uchun x'_y hosilasini toping.

254. $\lim_{x \rightarrow 0} \left(\frac{2}{\pi} \cdot \arccos x \right)^{\frac{1}{x}}$ limitni hisoblang.

255. $y = \frac{1}{\sqrt{1-2x}}$, $y^{(n)}(x) = ?$

256. $y = \frac{1+x}{1-x}$, $y^{(n)}(x) = ?$

257. $x = e^{2t} \cos^2 t$, $y = e^{2t} \sin^2 t$ $\left(\left| t \right| < \frac{\pi}{4} \right)$ parametrik ko'rinishda berilgan funksiya grafigining

$t_0 = \frac{\pi}{6}$ nuqtasiga yurgazilgan normal tenglamasini toping.

258. $f(x) = x + |\sin 2x|$ funksiyaning o'sish va kamayish oraliqlarini toping.

259. $x = t \cos t$, $y = t \sin t$ parametrik ko'rinishda berilgan funksiya grafigiga $M\left(\frac{\pi\sqrt{2}}{8}; \frac{\pi\sqrt{2}}{8}\right)$ nuqtada o'tkazilgan urinma va normal tenglamalarini toping.

260. $f(x) = \frac{x}{1+x}$, $E = \{0 \leq x < +\infty\}$, $\sup_{x \in E} f(x) = ?$, $\inf_{x \in E} f(x) = ?$

261. $y = 1 - |x^2 - 2|$ funksiya grafigining botiq va qavariq oraliqlarini toping.

262. $y = 4 \cdot \sqrt{(x-1)^5} + 20\sqrt{(x-1)^3}$ funksiya grafigining botiq va qavariq oraliqlarini toping

263. Koshi kriteriyasidan foydalanib, $x_n = \left(1 - \frac{1}{2}\right) \cdot \left(1 - \frac{1}{2^2}\right) \cdot \dots \cdot \left(1 - \frac{1}{2^n}\right)$ ketma-ketlikning yaqinlashuvchi ekanligini isbotlang.

264. $\lim_{x \rightarrow +\infty} \frac{x^{\ln x}}{(\ln x)^x}$ limitni hisoblang.

265. $y = \frac{x^2 - 2x + 2}{x - 1}$ funksiya grafigini chizing.

266. $x_n = \left(\frac{2n^2 + 2}{2n^2 + 1} \right)^{n^2}$ ketma-ketlik limitini toping.

267. $f(x) = \begin{cases} x^3 + x^2 + x + 1, & \text{eger } x \geq 1 \text{ bolsa} \\ 0, & \text{eger } x < 1 \text{ bolsa} \end{cases}$ funksiya $a = 1$ nuqtada limitga ega emasligini ko'rsating.

268. $f(x) = \begin{cases} e^x, & \text{eger } x < 0 \text{ bolsa} \\ 2 + x, & \text{eger } x \geq 0 \text{ bolsa} \end{cases}$ funksiya $a = 0$ nuqtada limitga ega emasligini ko'rsating.

269. $\lim_{x \rightarrow +0} \left(\frac{1 + \sin x - \cos x}{1 + \sin 4x - \cos 4x} \right)^{\frac{1}{x}}$ limitni hisoblang.

270. $x^3 + y^2 + 2x - 6 = 0$ oshkormas ko'rinishda berilgan egri chiziqqa $M(-1; 3)$ nuqtada o'tkazilgan urinma va normal tenglamalarini toping.

271. $y^4 - 4x^4 - 6xy = 0$ oshkormas ko'rinishda berilgan egri chiziqqa $M(1;2)$ nuqtada o'tkazilgan urinma va normal tenglamalarini toping.

272. $f(x) = x^n e^{-x}$ ($n > 0, x \geq 0$) funksiyaning o'sish va kamayish oraliqlarini toping.

273. $f(x) = \operatorname{tg}^2 x, E = \left\{-\frac{\pi}{2} < x < \frac{\pi}{2}\right\}, \sup_{x \in E} f(x) = ?, \inf_{x \in E} f(x) = ?$.

274. $f(x) = \frac{1}{x^2 - 4}, E = \{-1 \leq x \leq 1\}, \sup_{x \in E} f(x) = ?, \inf_{x \in E} f(x) = ?$

275. $y = (1 + x^2)e^x$ funksiya grafigining botiq va qavariq oraliqlarini toping.

276. $\lim_{x \rightarrow 0} \frac{x^3 \cdot \sin \frac{1}{x}}{\sin^2 x}$ limitni hisoblang.

277. $\lim_{x \rightarrow 0} \left(\frac{\sin x}{x}\right)^{\frac{1}{x^2}}$ limitni hisoblang.

278. $y = \frac{(x+1)^2}{x-2}$ funksiya grafigini chizing.

279. $x = t^2, y = t^3$ parametrik ko'rinishda berilgan funksiya grafigiga $M(4;8)$ nuqtada o'tkazilgan urinma va normal tenglamalarini toping.

280. $x = \frac{1+t}{t^3}, y = \frac{3}{2t^2} + \frac{1}{2t}$ parametrik ko'rinishda berilgan funksiya grafigiga $M(2;2)$ nuqtada o'tkazilgan urinma va normal tenglamalarini toping.

281. $y = x^2 \cdot \sin 2x; y^{(50)} = ?$

282. Koshi kriteriyasidan foydalanib, $x_n = 1 + \frac{1}{2!} + \dots + \frac{1}{n!}$ ketma-ketlikning yaqinlashuvchi ekanligini isbotlang.

283. Sonli ketma-ketlik ta'rifi bo'yisha $a = 0$ soni $x_n = \frac{1}{n} \sin \frac{\pi n}{2}$ ketma-ketlikning limiti ekanligini isbotlang.

284. $f(x) = \frac{1}{x}$ funksiyaning $X = \left[\frac{1}{5}; 1\right]$ to'plamda tekis uzluksiz ekanligini ko'rsating.

285. $x = t + 2t^2 + t^3, y = -2 + 3t - t^3, 1 < t < +\infty$ parametrik ko'rinishda berilgan $x = x(y)$ funksiya uchun x'_y hosilasini toping.

286. $(2a - x)y^2 = x^3 (y < 0)$ tenglama bilan berilgan oshkormas $y(x)$ funksiyaning hosilasini toping.

287. $f_1(x) = x - x^3$ va $f_2(x) = 5x$ funksiya grafiklari qaysi nuqtalarda va qanday burchak ostida kesishadi?

288. $y = x + \frac{\ln x}{x}$ funksiya grafigining asimptotalarini toping.

289. $y = |e^x - 1|$ funksiya grafigining asimptotalarini toping.

290. $f(x) = \frac{1}{x + 3^{\frac{1}{3-x}}}$ funksiyaning $a = 3$ nuqtada ong va chap limitlarini toping.

291. Koshi kriteriyasidan foydalanib, $x_n = 0, 33...3$ ketma-ketlikning yaqinlashuvchi ekanligini n ma'rte isbotlang.

292. $y = 1 + x \cdot e^{\frac{x}{2}}$ funksiya grafigining asimptotalarin toping.

293. $f(x) = 2^{tgx}$ funksiyaning $a = \frac{\pi}{2}$ nuqtada ong va chap limitlarini toping.

294. Koshi kriteriyasidan foydalanib, $x_n = 0, 77...7$ ketma-ketlikning yaqinlashuvchi ekanligini n ma'rte isbotlang.

294. $y = (x-1)^2 \cdot (x+2)$ funksiya grafigini chizing.

295. $f(x) = \arccos(x-1)$ funksiyaning $a = 0$ nuqtada ong va chap limitlarini toping.

296. $f(x) = 3x - 5$ funksiyaning $X = (-\infty; +\infty)$ to'plamda tekis uzluksiz ekanligini ko'rsating.

297. $y = \frac{1}{5} \cdot (4x^3 - x^4)$ funksiya grafigini chizing.

298. $f(x) = \frac{x - |x|}{2x}$ funksiyaning $a = 0$ nuqtada ong va chap limitlarini toping.

299. $x^5 + y^5 - 2xy = 0$ oshkormas ko'rinishda berilgan egri chiziqqa $M(1;1)$ nuqtada o'tkazilgan urinma va normal tenglamalarini toping.

300. $y = 16x(x-1)^3$ funksiya grafigini chizing.

301. $f(x) = \sin \frac{1}{x}$ funksiya $a = 0$ nuqtada limitga ega emasligini ko'rsating.

302. $\left(\frac{x}{a}\right)^n + \left(\frac{y}{b}\right)^n = 2, n \in N$ oshkormas ko'rinishda berilgan egri chiziqqa $M(a;b)$ nuqtada o'tkazilgan urinma va normal tenglamalarini toping.

303. $\lim_{x \rightarrow +\infty} (3x^2 + 3^x)^{\frac{1}{x}}$ limitni hisoblang.

304. $f(x) = \cos \frac{1}{x}$ funksiya $a = 0$ nuqtada limitga ega emasligini ko'rsating.

305. $f_1(x) = x^2 - 4x + 4$ va $f_2(x) = -x^2 + 6x - 4$ funksiya grafiklari qaysi nuqtalarda va qanday burchak ostida kesishadi?

306. $y = x^2 \ln x$ funksiya grafigining asimptotalarin toping

307. Funksiya limitini ta'rifidan foydalanib, $\lim_{x \rightarrow 3} x^4 = 81$ tenglikni isbotlang.

308. $y = \cos x + \frac{1}{2} \cos 2x$ funksiyaning ekstremumlarini toping.

309. $y = \ln(1 + e^{-x})$ funksiya grafigining asimptotalarin toping.

310. Funksiya limitini ta'rifidan foydalanib, $\lim_{x \rightarrow -1} \frac{7x^2 + 8x + 1}{x + 1} = -6$ tenglikni isbotlang.

311. $y = x^4 - 2x^2 + 5$ funksiyaning $-2 \leq x \leq 2$ kesmadagi eng katta va eng kishik qiymatlarini toping..

312. $y = \frac{1}{\sin x + \cos x}$ funksiya grafigining asimptotalarini toping.

313. $x_n = \cos^n \frac{2n\pi}{3}$, $\overline{\lim} x_n = ?$, $\underline{\lim} x_n = ?$

314. $y = x + 2\sqrt{x}$ funksiyaning $0 < x \leq 4$ oraliqtagi eng katta va eng kishik qiymatlarini toping, agar ular bor bo'lsa.

315. $y = |e^x - 1|$ funksiya grafigining egilish nuqtalarini toping.

316. $x_n = -n \cdot [2 + (-1)^n]$, $\overline{\lim} x_n = ?$, $\underline{\lim} x_n = ?$

317. $y = \sqrt[3]{(x^2 - 1)^2}$ funksiyaning ekstremumlarini toping.

318. $y = \left(1 + \frac{1}{x}\right)^x$ funksiya grafigining asimptotalarini toping.

319. $x_n = \left(n - \sqrt[3]{n^3 - 5}\right) \cdot n\sqrt{n}$ ketma-ketlik limitini toping.

320. $y = x \cdot |x|$ funksiyaning $-2 \leq x \leq 2$ kesmadagi eng katta va eng kishik qiymatlarini toping.

321. $x_n = \frac{(3n-1)! + (3n+1)!}{(3n)! \cdot (n-1)!}$ ketma-ketlik limitini toping.

322. $f(x) = (x+1)\left(\frac{x-1}{x-2}\right)^2$, $E = \left\{\frac{3}{2} < x < 6\right\}$, $\sup_{x \in E} f(x) = ?$, $\inf_{x \in E} f(x) = ?$

323. $y = \sin^4 x + \cos^4 x$ funksiya grafigining egilish nuqtalarini toping.

324. $x_n = \frac{3}{4} + \frac{5}{16} + \dots + \frac{9}{64} + \dots + \frac{1+2^n}{4^n}$ ketma-ketlik limitini toping.

325. $y = e^{\arctg x}$ funksiya grafigining egilish nuqtalarini toping

326. $f(x) = \frac{1}{x} + x^2$, $E = \{0 < x \leq 1\}$, $\sup_{x \in E} f(x) = ?$, $\inf_{x \in E} f(x) = ?$

327. $y = 4x^2 + \frac{1}{x}$ funksiya grafigining egilish nuqtalarini toping.

328. $f(x) = \ln \sqrt[3]{7x-2}$ funksiyani Teylor formulasi bo'yicha $x_0 = 1$ nuqtaning atrofida $o\left((x-x_0)^2\right)$ hadgacha yoying

329. $f(x) = |(x-1)(x-2)|$ funksiyaning $x_0 = 1$ nuqtadagi ong va chap tomonlama hosilalarini toping.

330. $y = \frac{|x-1|}{x \cdot \sqrt{x}}$ funksiya grafigining botiq va qavariq oraliqlarini toping.

331. $f(x) = \sin(x+1)\sin(x+2)$ funksiyani Teylor formulasi bo'yicha $x_0 = -1$ nuqtaning atrofida $o\left((x-x_0)^2\right)$ hadgacha yoying.

332. $y = x \cdot \ln^2 x$ funksiyaning ekstremumlarini toping.

333. $y = \ln(1 + x^3)$ funksiya grafigining botiq va qavariq oraliqlarin toping.

334. $f(x) = x^2 e^{-2x}$ funksiyanı Teylor formulasi bo'yicha $x_0 = -1$ nuqtaning atrofida $o((x - x_0)^2)$ hadgacha yoying.

335. Sonli ketma-ketlik ta'rifi bo'yisha $a = \frac{1}{2}$ soni $x_n = \frac{2n^2 + 3n + 4}{4n^2 - 5n + 6}$ ketma-ketlikning limiti ekanligini isbotlang.

336. $y = x + \sin x$ funksiya grafigining botiq va qavariq oraliqlarin toping.

337. $f(x) = x e^{2x}$ funksiyanı Teylor formulasi bo'yicha $x_0 = -1$ nuqtaning atrofida $o((x - x_0)^2)$ hadgacha yoying

338. $f(x) = x + \left[x^2 \right]$ funksiyaning $a = 10$ nuqtada ong va chap limitlarini toping.

339. $\lim_{x \rightarrow 0} (ctgx)^{\frac{1}{\ln x}}$ limitni hisoblang.

340. $f(x) = \sin(2x - 3)$ funksiyanı Teylor formulasi bo'yicha $x_0 = 1$ nuqtaning atrofida $o((x - x_0)^2)$ hadgacha yoying.