

$$f(x) = \begin{cases} 1, & \text{егер } x < 0, \\ \cos x, & \text{егер } 0 \leq x < \pi/2, \\ 1 - x, & \text{егер } x \geq \pi/2. \end{cases}$$

Оның үзіліссіздігін зерттеу. Сұлба түрінде сызбасын

- 3.1. $\lim_{x \rightarrow 2} \frac{\operatorname{tg}(x^2 - 3x + 2)}{x^2 - 4}$ табу. (Жауабы: $1/4$.)
2. $x_1 = 0$ және $x_2 = -2$ нүктелеріндегі $f(x) = (3x - 2)/(x + 2)$ функциясының үзіліссіздігін зерттеу. Сұлба түрінде сызбасын жасау.

5.5. 5-тарауға жеке үй тапсырмалары

ЖҮТ - 5.1

Көрсетілген шектерді табу.

1

- | | |
|---|---|
| 1.1. $\lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x^2 - 12x + 20}$ | 1.2. $\lim_{x \rightarrow 0} \frac{x^3 - x^2 + 2x}{x^2 + x}$ |
| 1.3. $\lim_{x \rightarrow 3} \frac{6 + x - x^2}{x^3 - 27}$ | 1.4. $\lim_{x \rightarrow 1} \frac{2x^2 - x - 1}{3x^2 - x - 2}$ |
| 1.5. $\lim_{x \rightarrow 2} \frac{2x^2 - 7x + 4}{x^2 - 5x + 6}$ | 1.6. $\lim_{x \rightarrow 3} \frac{12 + x - x^2}{x^3 - 27}$ |
| 1.7. $\lim_{x \rightarrow 1/3} \frac{3x^2 + 2x - 1}{27x^3 - 1}$ | 1.8. $\lim_{x \rightarrow -1} \frac{x^2 - 4x - 5}{x^2 - 2x - 3}$ |
| 1.9. $\lim_{x \rightarrow -1} \frac{3x^2 + 2x - 1}{-x^2 + x + 2}$ | 1.10. $\lim_{x \rightarrow 3} \frac{3x^2 - 11x + 6}{2x^2 - 5x - 3}$ |
| 1.11. $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x^2 + x - 6}$ | 1.12. $\lim_{x \rightarrow -1} \frac{x^2 - x - 2}{x^3 + 1}$ |
| 1.13. $\lim_{x \rightarrow 4} \frac{x^2 - 16}{x^2 + x - 20}$ | 1.14. $\lim_{x \rightarrow -3} \frac{4x^2 + 11x - 3}{x^2 + 2x - 3}$ |

$$1.15. \lim_{x \rightarrow 3} \frac{3x^2 - 7x - 6}{2x^2 - 7x + 3}$$

$$1.17. \lim_{x \rightarrow -1} \frac{5x^2 + 4x - 1}{3x^2 + x - 2}$$

$$1.19. \lim_{x \rightarrow -1} \frac{7x^2 + 4x - 3}{2x^2 + 3x + 1}$$

$$1.21. \lim_{x \rightarrow 2} \frac{2x^2 - 9x + 10}{x^2 + 3x - 10}$$

$$1.23. \lim_{x \rightarrow 2} \frac{-5x^2 + 11x - 2}{3x^2 - x - 10}$$

$$1.25. \lim_{x \rightarrow 5} \frac{3x^2 - 6x - 45}{2x^2 - 3x - 35}$$

$$1.27. \lim_{x \rightarrow -5} \frac{x^2 - 2x - 35}{2x^2 + 11x + 5}$$

$$1.29. \lim_{x \rightarrow 4} \frac{3x^2 - 2x - 40}{x^2 - 3x - 4}$$

$$1.16. \lim_{x \rightarrow -2} \frac{4x^2 + 7x - 2}{3x^2 + 8x + 4}$$

$$1.18. \lim_{x \rightarrow -1} \frac{x^2 - 4x - 5}{3x^2 + 2x - 2}$$

$$1.20. \lim_{x \rightarrow 4} \frac{3x^2 - 3x + 2}{x^2 - x - 12}$$

$$1.22. \lim_{x \rightarrow 1} \frac{4x^2 + x - 5}{x^2 - 2x + 1}$$

$$1.24. \lim_{x \rightarrow 7} \frac{x^2 - 5x - 14}{2x^2 - 9x - 35}$$

$$1.26. \lim_{x \rightarrow -3} \frac{4x^2 + 3x + 15}{x^2 - 6x - 27}$$

$$1.28. \lim_{x \rightarrow -8} \frac{2x^2 + 15x - 8}{3x^2 + 25x + 8}$$

$$1.30. \lim_{x \rightarrow -3} \frac{2x^2 + 5x - 3}{3x^2 + 10x + 3}$$

2

$$2.1. \lim_{x \rightarrow -3} \frac{2x^2 + 11x + 15}{3x^2 + 5x - 12}$$

$$2.3. \lim_{x \rightarrow 1} \frac{x^3 - 3x + 2}{x^2 - 4x + 3}$$

$$2.5. \lim_{x \rightarrow -1} \frac{x^4 - x^2 + x + 1}{x^4 + 1}$$

$$2.7. \lim_{x \rightarrow 2} \frac{x^2 - x + 3}{5x^2 + 3x - 3}$$

$$2.9. \lim_{x \rightarrow -1} \frac{x^2 - 1}{x^2 + 3x + 2}$$

$$2.11. \lim_{x \rightarrow -5} \frac{4x^2 + 19x - 5}{2x^2 + 11x + 5}$$

$$2.2. \lim_{x \rightarrow 1} \frac{2x^2 + 5x - 10}{x^3 - 1}$$

$$2.4. \lim_{x \rightarrow 2} \frac{3x^2 + 2x + 1}{x^3 - 8}$$

$$2.6. \lim_{x \rightarrow 1} \frac{2x^2 - 3x - 1}{x^4 - 1}$$

$$2.8. \lim_{x \rightarrow -2} \frac{x^2 + 2x}{x^2 + 4x + 4}$$

$$2.10. \lim_{x \rightarrow -4} \frac{2x^2 + 7x - 4}{x^3 + 64}$$

$$2.12. \lim_{x \rightarrow 1} \frac{x^3 - x^2 + x - 1}{x^3 + x - 2}$$

$$2.13. \lim_{x \rightarrow 1} \frac{x^2 - 2x + 1}{2x^2 - 7x + 5}.$$

$$2.15. \lim_{x \rightarrow -2} \frac{9x^2 + 17x - 2}{x^2 + 2x}.$$

$$2.17. \lim_{x \rightarrow 0} \frac{4x^3 - 2x^2 + 5x}{3x^2 + 7x}.$$

$$2.19. \lim_{x \rightarrow 3} \frac{3x^2 + 5x - 1}{x^2 - 5x + 6}.$$

$$2.21. \lim_{x \rightarrow 4} \frac{x^2 + 3x - 28}{x^3 - 64}.$$

$$2.23. \lim_{x \rightarrow 4} \frac{x^2 + 3x - 28}{x^2 - 4x}.$$

$$2.25. \lim_{x \rightarrow -2} \frac{x^2 - 4}{3x^2 + x - 10}.$$

$$2.27. \lim_{x \rightarrow 6} \frac{2x^2 - 11x - 6}{3x^2 - 20x + 12}.$$

$$2.29. \lim_{x \rightarrow 2} \frac{x^3 - 2x - 4}{x^2 - 11x + 18}.$$

$$2.14. \lim_{x \rightarrow 2} \frac{x^3 - 8}{2x^2 - 9x + 10}.$$

$$2.16. \lim_{x \rightarrow 1} \frac{x^3 + x - 2}{x^3 - x^2 - x + 1}.$$

$$2.18. \lim_{x \rightarrow 1} \frac{4x^4 - 5x^2 + 1}{x^2 - 1}.$$

$$2.20. \lim_{x \rightarrow -5} \frac{x^2 - x - 30}{x^3 + 125}.$$

$$2.22. \lim_{x \rightarrow 1/2} \frac{8x^3 - 1}{x^2 - 1/4}.$$

$$2.24. \lim_{x \rightarrow -2} \frac{3x^2 + 11x + 10}{x^2 - 5x + 14}.$$

$$2.26. \lim_{x \rightarrow 0} \frac{3x^2 + x}{4x^2 - 5x + 1}.$$

$$2.28. \lim_{x \rightarrow -6} \frac{x^2 + 2x - 24}{2x^3 + 15x + 18}.$$

$$2.30. \lim_{x \rightarrow 4} \frac{x^3 - 64}{7x^2 - 27x - 4}.$$

3

$$3.1. \lim_{x \rightarrow \infty} \frac{3x^3 - 5x^2 + 2}{2x^3 + 5x^2 - x}.$$

$$3.3. \lim_{x \rightarrow \infty} \frac{5x^4 - 3x^2 + 7}{x^4 + 2x^3 + 1}.$$

$$3.5. \lim_{x \rightarrow \infty} \frac{x^3 - 4x^2 + 28x}{5x^3 + 3x^2 + x - 1}.$$

$$3.7. \lim_{x \rightarrow \infty} \frac{-3x^4 + x^2 + x}{x^4 + 3x - 2}.$$

$$3.9. \lim_{x \rightarrow \infty} \frac{-x^2 + 3x + 1}{3x^2 + x - 5}.$$

$$3.11. \lim_{x \rightarrow \infty} \frac{4x^2 + 5x - 7}{2x^2 - x + 10}.$$

$$3.2. \lim_{x \rightarrow \infty} \frac{4x^3 + 7x}{2x^3 - 4x^2 + 5}.$$

$$3.4. \lim_{x \rightarrow \infty} \frac{7x^3 - 2x^2 + 4x}{2x^3 + 5}.$$

$$3.6. \lim_{x \rightarrow \infty} \frac{3x^2 + 10x + 3}{2x^3 + 5x - 3}.$$

$$3.8. \lim_{x \rightarrow \infty} \frac{2x^2 + 7x + 3}{5x^2 - 3x + 4}.$$

$$3.10. \lim_{x \rightarrow \infty} \frac{x^3 - 3x^2 + 10}{7x^3 + 2x + 1}.$$

$$3.12. \lim_{x \rightarrow \infty} \frac{3x^4 + 2x + 1}{x^4 - x^3 + 2x}.$$

3.13. $\lim_{x \rightarrow \infty} \frac{3x^2 + 2x + 9}{2x^2 - x + 4}$.

3.15. $\lim_{x \rightarrow \infty} \frac{2x^3 + 7x - 2}{3x^3 - x - 4}$.

3.17. $\lim_{x \rightarrow \infty} \frac{3x^4 - 6x^2 + 2}{x^4 + 4x - 3}$.

3.19. $\lim_{x \rightarrow \infty} \frac{8x^4 - 4x^2 + 3}{2x^4 + 1}$.

3.21. $\lim_{x \rightarrow \infty} \frac{7x^3 + 4x}{x^3 - 3x + 2}$.

3.23. $\lim_{x \rightarrow \infty} \frac{2x^3 + 7x^2 - 2}{6x^3 - 4x + 3}$.

3.25. $\lim_{x \rightarrow \infty} \frac{x - 2x^2 + 5x^4}{2 + 3x^2 + x^4}$.

3.27. $\lim_{x \rightarrow \infty} \frac{4 - 5x^2 - 3x^5}{x^5 + 6x + 8}$.

3.29. $\lim_{x \rightarrow \infty} \frac{4x^3 - 2x + 1}{2x^3 + 3x^2 + 2}$.

3.14. $\lim_{x \rightarrow \infty} \frac{3x^2 + 5x - 7}{3x^2 + x + 1}$.

3.16. $\lim_{x \rightarrow 0} \frac{18x^2 + 5x}{8 - 3x - 9x^2}$.

3.18. $\lim_{x \rightarrow \infty} \frac{8x^2 + 4x - 5}{4x^2 - 3x + 2}$.

3.20. $\lim_{x \rightarrow \infty} \frac{3x^2 - 4x + 2}{6x^2 + 5x + 1}$.

3.22. $\lim_{x \rightarrow \infty} \frac{1 + 4x - x^4}{x + 3x^2 + 2x^4}$.

3.24. $\lim_{x \rightarrow \infty} \frac{3x + 14x^2}{1 + 2x + 7x^2}$.

3.26. $\lim_{x \rightarrow \infty} \frac{3x^4 - 2x^2 - 7}{3x^4 + 3x + 5}$.

3.28. $\lim_{x \rightarrow \infty} \frac{5x^3 - 7x^2 + 3}{2 + 2x - x^3}$.

3.30. $\lim_{x \rightarrow \infty} \frac{5x^2 - 3x + 1}{3x^2 + x - 5}$.

4

4.1. $\lim_{x \rightarrow -\infty} \frac{x^5 - 2x + 4}{2x^4 + 3x^2 + 1}$.

4.3. $\lim_{x \rightarrow -\infty} \frac{3x^2 + 7x - 4}{x^5 + 2x - 1}$.

4.5. $\lim_{x \rightarrow \infty} \frac{2x^3 + 7x - 1}{3x^4 + 2x + 5}$.

4.7. $\lim_{x \rightarrow -\infty} \frac{3x^6 - 5x^2 + 2}{2x^3 + 4x - 5}$.

4.9. $\lim_{x \rightarrow -\infty} \frac{7x^2 + 5x + 9}{1 + 4x - x^3}$.

4.2. $\lim_{x \rightarrow \infty} \frac{3x^4 + 2x - 5}{2x^2 + x + 7}$.

4.4. $\lim_{x \rightarrow \infty} \frac{3x - x^6}{x^2 - 2x + 5}$.

4.6. $\lim_{x \rightarrow -\infty} \frac{2x^3 + 7x^2 + 4}{x^4 + 5x - 1}$.

4.8. $\lim_{x \rightarrow \infty} \frac{x^7 + 5x^2 - 4x}{3x^2 + 11x - 7}$.

4.10. $\lim_{x \rightarrow \infty} \frac{3x^4 + x^2 - 6}{2x^2 + 3x + 1}$.

- 4.11. $\lim_{x \rightarrow -\infty} \frac{2x^2 + 5x + 7}{3x^4 - 2x^2 + x}$
- 4.12. $\lim_{x \rightarrow \infty} \frac{3x^3 + 4x^2 - 7x}{2x^2 + 7x - 3}$
- 4.13. $\lim_{x \rightarrow -1} \frac{5x^3 - 3x^2 + 7}{2x^4 + 3x^2 + 1}$
- 4.14. $\lim_{x \rightarrow \infty} \frac{5x^2 - 3x + 1}{1 + 2x - x^4}$
- 4.15. $\lim_{x \rightarrow -\infty} \frac{2x^3 + 3x^2 + 5}{3x^2 - 4x + 1}$
- 4.16. $\lim_{x \rightarrow \infty} \frac{6x^2 - 5x + 2}{4x^3 + 2x - 1}$
- 4.17. $\lim_{x \rightarrow -\infty} \frac{11x^3 + 3x}{2x^2 - 2x + 1}$
- 4.18. $\lim_{x \rightarrow \infty} \frac{8x^2 + 3x + 5}{4x^3 - 2x^2 + 1}$
- 4.19. $\lim_{x \rightarrow -\infty} \frac{6x^3 + 5x^2 - 3}{2x^2 - x + 7}$
- 4.20. $\lim_{x \rightarrow \infty} \frac{3x^2 + 4x - 7}{x^3 - 2x^2 + 1}$
- 4.21. $\lim_{x \rightarrow -\infty} \frac{8x^5 - 4x^3 + 3}{2x^3 + x - 7}$
- 4.22. $\lim_{x \rightarrow \infty} \frac{2x^2 - 7x + 1}{x^3 + 4x^2 - 3}$
- 4.23. $\lim_{x \rightarrow -\infty} \frac{5x^4 - 2x^3 + 3}{2x^2 + 3x - 7}$
- 4.24. $\lim_{x \rightarrow \infty} \frac{8x^3 + x^2 - 7}{2x^2 - 5x + 3}$
- 4.25. $\lim_{x \rightarrow -\infty} \frac{3x^4 + 2x^2 - 8}{8x^3 - 4x + 5}$
- 4.26. $\lim_{x \rightarrow \infty} \frac{3x^4 + 2x - 4}{3x^3 - 4x + 1}$
- 4.27. $\lim_{x \rightarrow -\infty} \frac{7x^3 - 2x + 4}{2x^2 + x - 5}$
- 4.28. $\lim_{x \rightarrow \infty} \frac{4x^3 + 5x^2 - 3x}{3x^2 + x - 10}$
- 4.29. $\lim_{x \rightarrow -\infty} \frac{2x^2 + 10x - 11}{3x^4 - 2x + 5}$
- 4.30. $\lim_{x \rightarrow \infty} \frac{7x^2 + 3x - 4}{2x^2 - 5x + 1}$

5

- 5.1. $\lim_{x \rightarrow \infty} \frac{2x^2 + 3x - 5}{7x^3 - 2x^2 + 1}$
- 5.2. $\lim_{x \rightarrow -\infty} \frac{3x^2 - 7x + 2}{x^4 + 2x - 4}$
- 5.3. $\lim_{x \rightarrow \infty} \frac{7x^4 - 3x + 4}{3x^2 - 2x + 1}$
- 5.4. $\lim_{x \rightarrow -\infty} \frac{2x^2 - x + 7}{3x^4 - 5x^2 + 10}$
- 5.5. $\lim_{x \rightarrow -\infty} \frac{4x^3 - 2x^2 + x}{3x^2 - x}$
- 5.6. $\lim_{x \rightarrow \infty} \frac{3x^4 - 2x + 1}{3x^2 + 2x - 5}$
- 5.7. $\lim_{x \rightarrow \infty} \frac{2x^2 - 5x + 2}{x^4 + 3x^2 - 9}$
- 5.8. $\lim_{x \rightarrow -\infty} \frac{5x^2 - 4x + 2}{4x^3 + 2x - 5}$

$$5.9. \lim_{x \rightarrow \infty} \frac{2x^3 - 3x^2 + 2x}{x^2 + 7x + 1}$$

$$5.11. \lim_{x \rightarrow \infty} \frac{7x^5 + 6x^4 - x^3}{2x^2 + 6x + 1}$$

$$5.13. \lim_{x \rightarrow -\infty} \frac{7 - 3x^4}{2x^3 + 3x^2 - 5}$$

$$5.15. \lim_{x \rightarrow -\infty} \frac{3x + 7}{2 - 3x + 4x^2}$$

$$5.17. \lim_{x \rightarrow \infty} \frac{10x - 7}{3x^4 + 2x^3 + 1}$$

$$5.19. \lim_{x \rightarrow \infty} \frac{5x + 3}{x^3 - 4x^2 - x}$$

$$5.21. \lim_{x \rightarrow \infty} \frac{2x^2 - 5x + 3}{3x^4 - 2x^2 + x}$$

$$5.23. \lim_{x \rightarrow \infty} \frac{3x + 1}{x^3 - 5x^2 + 4x}$$

$$5.25. \lim_{x \rightarrow \infty} \frac{4x^2 - 10x + 7}{2x^3 - 3x}$$

$$5.27. \lim_{x \rightarrow \infty} \frac{2x - 13}{x^7 - 3x^5 - 4x}$$

$$5.29. \lim_{x \rightarrow \infty} \frac{x^3 - 81}{3x^2 + 4x + 2}$$

$$5.10. \lim_{x \rightarrow -\infty} \frac{3x^2 - 7x + 5}{4x^5 - 3x^3 + 2}$$

$$5.12. \lim_{x \rightarrow -\infty} \frac{4 - 3x - 2x^2}{3x^4 + 5x}$$

$$5.14. \lim_{x \rightarrow \infty} \frac{8x^4 + 7x^3 - 3}{3x^2 - 5x + 1}$$

$$5.16. \lim_{x \rightarrow -\infty} \frac{2x^3 - 3x + 1}{7x + 5}$$

$$5.18. \lim_{x \rightarrow -\infty} \frac{5x^4 - 3x^2}{1 + 2x + 3x^2}$$

$$5.20. \lim_{x \rightarrow -\infty} \frac{3x^4 + 5x}{2x^2 - 3x - 7}$$

$$5.22. \lim_{x \rightarrow -\infty} \frac{2x^5 - x^3}{4x^2 + 3x - 6}$$

$$5.24. \lim_{x \rightarrow -\infty} \frac{2 - x - 3x^2}{x^3 - 16}$$

$$5.26. \lim_{x \rightarrow -\infty} \frac{2x^3 - 3x + 1}{x^5 + 4x^3}$$

$$5.28. \lim_{x \rightarrow -\infty} \frac{2x^2 - 3x + 1}{x^3 + 2x^2 + 5}$$

$$5.30. \lim_{x \rightarrow -\infty} \frac{7x + 4}{3x^3 - 5x + 1}$$

6

$$6.1. \lim_{x \rightarrow 3} \frac{x^2 + x - 12}{\sqrt{x} - 2 - \sqrt{4 - x}}$$

$$6.2. \lim_{x \rightarrow -4} \frac{\sqrt{x+12} - \sqrt{4-x}}{x^2 + 2x - 8}$$

$$6.3. \lim_{x \rightarrow -3} \frac{\sqrt{x+10} - \sqrt{4-x}}{2x^2 - x - 21}$$

$$6.4. \lim_{x \rightarrow -2} \frac{\sqrt{2-x} - \sqrt{x+6}}{x^2 - x - 6}$$

$$6.5. \lim_{x \rightarrow 1} \frac{\sqrt{3+2x} - \sqrt{x+4}}{3x^2 - 4x + 1}$$

$$6.6. \lim_{x \rightarrow 2} \frac{x^2 - 3x + 2}{\sqrt{5-x} - \sqrt{x+1}}$$

$$6.7. \lim_{x \rightarrow -1} \frac{3x^2 + 4x + 1}{\sqrt{x+3} - \sqrt{5+3x}}$$

$$6.8. \lim_{x \rightarrow 4} \frac{2x^2 - 9x + 4}{\sqrt{5-x} - \sqrt{r-2}}$$

$$6.9. \lim_{x \rightarrow 5} \frac{\sqrt{2x+1} - \sqrt{x+6}}{2x^2 - 7x - 15}$$

$$6.11. \lim_{x \rightarrow 0} \frac{\sqrt{x^2+2} - \sqrt{2}}{\sqrt{x^2+1} - 1}$$

$$6.13. \lim_{x \rightarrow 0} \frac{3x}{\sqrt{1+x} - \sqrt{1-x}}$$

$$6.15. \lim_{x \rightarrow -1} \frac{\sqrt{5+x} - 2}{\sqrt{8-x} - 3}$$

$$6.17. \lim_{x \rightarrow 7} \frac{\sqrt{x-3} - 2}{\sqrt{x+2} - 3}$$

$$6.19. \lim_{x \rightarrow 3} \frac{\sqrt{5x+1} - 4}{x^2 + 2x - 15}$$

$$6.21. \lim_{x \rightarrow 0} \frac{\sqrt{x^2+4} - 2}{\sqrt{x^2+16} - 4}$$

$$6.23. \lim_{x \rightarrow 9} \frac{\sqrt{2x+7} - 5}{3 - \sqrt{x}}$$

$$6.25. \lim_{x \rightarrow 3} \frac{x^3 - 27}{\sqrt{3x} - x}$$

$$6.27. \lim_{x \rightarrow -4} \frac{\sqrt{x+20} - 4}{x^3 + 64}$$

$$6.29. \lim_{x \rightarrow 0} \frac{\sqrt{9+x} - 3}{x^2 + x}$$

$$6.10. \lim_{x \rightarrow -5} \frac{\sqrt{3x+17} - \sqrt{2x+12}}{x^2 + 8x + 15}$$

$$6.12. \lim_{x \rightarrow 0} \frac{\sqrt{7-x} - \sqrt{7+x}}{\sqrt{7x}}$$

$$6.14. \lim_{x \rightarrow 4} \frac{\sqrt{2x+1} - 3}{\sqrt{x-2} - \sqrt{2}}$$

$$6.16. \lim_{x \rightarrow 5} \frac{\sqrt{x+4} - 3}{\sqrt{x-1} - 2}$$

$$6.18. \lim_{x \rightarrow 3} \frac{\sqrt{4x-3} - 3}{x^2 - 9}$$

$$6.20. \lim_{x \rightarrow 0} \frac{2 - \sqrt{x^2+4}}{3x^2}$$

$$6.22. \lim_{x \rightarrow 0} \frac{3x}{\sqrt{5-x} - \sqrt{5+x}}$$

$$6.24. \lim_{x \rightarrow 4} \frac{2 - \sqrt{x}}{\sqrt{6x+1} - 5}$$

$$6.26. \lim_{x \rightarrow 0} \frac{\sqrt{1+3x^2} - 1}{x^3 + x^2}$$

$$6.28. \lim_{x \rightarrow 1} \frac{3x^2 - 2}{\sqrt{8+x} - 3}$$

$$6.30. \lim_{x \rightarrow 2} \frac{\sqrt{4x+1} - 3}{x^3 - 8}$$

7.1. $\lim_{x \rightarrow \infty} \left(\frac{x+4}{x+8} \right)^{-3x}$

7.3. $\lim_{x \rightarrow \infty} \left(\frac{2x}{1+2x} \right)^{-4x}$

7.5. $\lim_{x \rightarrow \infty} \left(\frac{2x+5}{2x+1} \right)^{5x}$

7.7. $\lim_{x \rightarrow \infty} \left(\frac{x+2}{x+1} \right)^{1+2x}$

7.9. $\lim_{x \rightarrow \infty} \left(\frac{2x}{2x-3} \right)^{3x}$

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

7.13. $\lim_{x \rightarrow \infty} \left(\frac{x-2}{x+1} \right)^{2x-3}$

7.15. $\lim_{x \rightarrow \infty} \left(\frac{3x-4}{3x+2} \right)^{2x}$

7.17. $\lim_{x \rightarrow \infty} \left(\frac{2x-4}{2x} \right)^{-3x}$

7.19. $\lim_{x \rightarrow \infty} \left(\frac{x-7}{x+1} \right)^{4x-2}$

7.21. $\lim_{x \rightarrow \infty} \left(\frac{2-3x}{5-3x} \right)^{x}$

7.23. $\lim_{x \rightarrow \infty} \left(\frac{4x-1}{4x+1} \right)^{2x}$

7.25. $\lim_{x \rightarrow \infty} \left(\frac{2x-1}{2x+4} \right)^{-x}$

7.27. $\lim_{x \rightarrow \infty} \left(\frac{1+2x}{3+2x} \right)^{-x}$

7.29. $\lim_{x \rightarrow \infty} \left(\frac{x}{x-1} \right)^{3-2x}$

7.2. $\lim_{x \rightarrow \infty} \left(\frac{x}{x+1} \right)^{2x-3}$

7.4. $\lim_{x \rightarrow \infty} \left(\frac{x-1}{x} \right)^{2-3x}$

7.6. $\lim_{x \rightarrow \infty} \left(\frac{x+3}{x} \right)^{-5x}$

7.8. $\lim_{x \rightarrow \infty} \left(\frac{x+3}{x-1} \right)^{x-4}$

7.10. $\lim_{x \rightarrow \infty} \left(\frac{x-7}{x} \right)^{2x+1}$

7.12. $\lim_{x \rightarrow \infty} \left(\frac{2x+1}{2x-1} \right)^{x+2}$

7.14. $\lim_{x \rightarrow \infty} \left(\frac{x}{x-3} \right)^{x-5}$

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

7.18. $\lim_{x \rightarrow \infty} \left(\frac{x+5}{x} \right)^{3x+4}$

7.20. $\lim_{x \rightarrow \infty} \left(\frac{x+2}{x} \right)^{3-2x}$

7.22. $\lim_{x \rightarrow \infty} \left(\frac{1-x}{2-x} \right)^{3x}$

7.24. $\lim_{x \rightarrow \infty} \left(\frac{3x+4}{3x} \right)^{-2x}$

7.26. $\lim_{x \rightarrow \infty} \left(\frac{3x+4}{3x+5} \right)^{x+1}$

7.28. $\lim_{x \rightarrow \infty} \left(\frac{3x}{3x+2} \right)^{x-2}$

7.30. $\lim_{x \rightarrow \infty} \left(\frac{4-2x}{1-2x} \right)^{x+1}$

- 8.1. $\lim_{x \rightarrow \infty} \left(\frac{2x+3}{5x+7} \right)^{x+1}$
- 8.2. $\lim_{x \rightarrow \infty} \left(\frac{2x+1}{x-1} \right)^x$
- 8.3. $\lim_{x \rightarrow \infty} \left(\frac{x+1}{2x-1} \right)^{3x}$
- 8.4. $\lim_{x \rightarrow -\infty} \left(\frac{2x-1}{4x+1} \right)^{3x-1}$
- 8.5. $\lim_{x \rightarrow \infty} \left(\frac{5x+8}{x-2} \right)^{x+4}$
- 8.6. $\lim_{x \rightarrow -\infty} \left(\frac{x+1}{3x-1} \right)^{2x+1}$
- 8.7. $\lim_{x \rightarrow -\infty} \left(\frac{2x+1}{x-1} \right)^{4x}$
- 8.8. $\lim_{x \rightarrow \infty} \left(\frac{x+1}{2x-1} \right)^{5x}$
- 8.9. $\lim_{x \rightarrow -\infty} \left(\frac{x+3}{2x-4} \right)^{x+2}$
- 8.10. $\lim_{x \rightarrow -\infty} \left(\frac{2x+1}{3x-1} \right)^{x-1}$
- 8.11. $\lim_{x \rightarrow \infty} \left(\frac{5x-3}{x+4} \right)^{x+3}$
- 8.12. $\lim_{x \rightarrow -\infty} \left(\frac{2x-3}{7x+4} \right)^x$
- 8.13. $\lim_{x \rightarrow -\infty} \left(\frac{x-5}{3x+4} \right)^{2x}$
- 8.14. $\lim_{x \rightarrow \infty} \left(\frac{x+3}{4x-5} \right)^{2x}$
- 8.15. $\lim_{x \rightarrow -\infty} \left(\frac{x-2}{3x+1} \right)^{5x}$
- 8.16. $\lim_{x \rightarrow -\infty} \left(\frac{3x-4}{x+6} \right)^{x-1}$
- 8.17. $\lim_{x \rightarrow \infty} \left(\frac{x-2}{3x+10} \right)^{3x}$
- 8.18. $\lim_{x \rightarrow -\infty} \left(\frac{2x-3}{x+4} \right)^{6x+1}$
- 8.19. $\lim_{x \rightarrow -\infty} \left(\frac{x+3}{3x-1} \right)^{2x}$
- 8.20. $\lim_{x \rightarrow \infty} \left(\frac{6x+5}{x-10} \right)^{5x}$
- 8.21. $\lim_{x \rightarrow -\infty} \left(\frac{3x+7}{x+4} \right)^{4x}$
- 8.22. $\lim_{x \rightarrow \infty} \left(\frac{x-1}{4x+5} \right)^{3x}$
- 8.23. $\lim_{x \rightarrow -\infty} \left(\frac{5x-7}{x+6} \right)^{2x}$
- 8.24. $\lim_{x \rightarrow \infty} \left(\frac{3-4x}{2-x} \right)^{6x}$
- 8.25. $\lim_{x \rightarrow \infty} \left(\frac{1-2x}{3-x} \right)^{-x}$
- 8.26. $\lim_{x \rightarrow -\infty} \left(\frac{4+3x}{5+x} \right)^{7x}$
- 8.27. $\lim_{x \rightarrow -\infty} \left(\frac{3x-1}{2x+5} \right)^{3x}$
- 8.28. $\lim_{x \rightarrow \infty} \left(\frac{1-x}{2-10x} \right)^{5x}$
- 8.29. $\lim_{x \rightarrow \infty} \left(\frac{3+x}{9x-4} \right)^{2x}$
- 8.30. $\lim_{x \rightarrow -\infty} \left(\frac{x+5}{4x-2} \right)^{3x}$

9.1. $\lim_{x \rightarrow 0} \frac{1 - \cos 8x}{3x^2}$.

9.3. $\lim_{x \rightarrow 0} \frac{\cos x - \cos 5x}{2x^2}$.

9.5. $\lim_{x \rightarrow 0} \frac{\operatorname{tg} x - \sin x}{3x^2}$.

9.7. $\lim_{x \rightarrow 1} (1 - x) \operatorname{tg} \frac{\pi x}{2}$.

9.9. $\lim_{x \rightarrow 0} \frac{\operatorname{tg} 2x - \sin 2x}{x^2}$.

9.11. $\lim_{x \rightarrow 0} \left(\frac{1}{\operatorname{tg} x} - \frac{1}{\sin x} \right)$.

9.13. $\lim_{x \rightarrow 0} \frac{\sin 7x + \sin 3x}{x \sin x}$.

9.15. $\lim_{x \rightarrow 0} \frac{\cos 2x - \cos 4x}{3x^2}$.

9.17. $\lim_{x \rightarrow 0} \frac{\operatorname{tg} 3x - \sin 3x}{2x^2}$.

9.19. $\lim_{x \rightarrow 0} \frac{\cos 4x - \cos^3 4x}{3x^2}$.

9.21. $\lim_{x \rightarrow 0} \frac{\cos^2 x - \cos^2 2x}{x^2}$.

9.23. $\lim_{x \rightarrow 0} \frac{1 - \cos^2 2x}{x \arcsin x}$.

9.25. $\lim_{x \rightarrow 0} \frac{\cos 5x - \cos x}{4x^2}$.

9.27. $\lim_{x \rightarrow \pi/2} \frac{1 - \sin x}{(\pi/2 - x)^2}$.

9.29. $\lim_{x \rightarrow 0} \frac{7x}{\sin x + \sin 7x}$.

9.2. $\lim_{x \rightarrow 0} \frac{\sin 3x - \sin x}{5x}$.

9.4. $\lim_{x \rightarrow 0} \frac{\operatorname{tg} 3x}{2 \sin x}$.

9.6. $\lim_{x \rightarrow 0} \frac{\arcsin 5x}{\sin 3x}$.

9.8. $\lim_{x \rightarrow \pi/2} \frac{1 - \sin x}{\pi - 2x}$.

9.10. $\lim_{x \rightarrow 0} \frac{1 - \cos^2 x}{x \operatorname{tg} x}$.

9.12. $\lim_{x \rightarrow 0} \frac{\sin^2 3x - \sin^2 x}{x^2}$.

9.14. $\lim_{x \rightarrow 0} \frac{1 - \cos 5x}{2x^2}$.

9.16. $\lim_{x \rightarrow 0} \frac{\operatorname{arctg} 2x}{\operatorname{tg} 3x}$.

9.18. $\lim_{x \rightarrow \pi/4} \frac{1 - \sin 2x}{\pi - 4x}$.

9.20. $\lim_{x \rightarrow 0} \left(\frac{1}{\sin 2x} - \frac{1}{\operatorname{tg} 2x} \right)$.

9.22. $\lim_{x \rightarrow 0} \frac{\arcsin 5x}{x^2 - x}$.

9.24. $\lim_{x \rightarrow 0} \frac{1 - \cos 4x}{x \sin x}$.

9.26. $\lim_{x \rightarrow 0} \frac{\sin 5x + \sin x}{\arcsin x}$.

9.28. $\lim_{x \rightarrow \pi/2} (\pi/2 - x) \operatorname{tg} x$.

9.30. $\lim_{x \rightarrow 0} \frac{\cos x - \cos^3 x}{5x^2}$.

1.30 Диаметрі d , дөңгелек бөренеден, тікбұрышты көлденең қиылған арқалық мәткені кесіп алу керек. Арқалық мәткенің иілуіне көбірек кедергі келтіру үшін, осы қиманың ені мен биіктігі қандай болуы тиіс? Арқалық мәткенің Q иілуге кедергісі, оның көлденең қимасының x ені мен оның y биіктігі квадратының көбейтіндісіне пропорционал, яғни $Q = k x^2$, $k = const$. (Жауабы: $x = d \sqrt{3/3}$, $y = \sqrt{6/3}$.)

2. Көрсетілген функцияларға толық зерттеу жүргізу және олардың графиктерін құру.

$$2.1. \quad y = \frac{x^2 - 2x + 2}{x - 1}.$$

$$2.2. \quad y = \frac{x + 1}{(x - 1)^2}.$$

$$2.3. \quad y = e^{1/(5+x)}.$$

$$2.4. \quad y = x/(9 - x).$$

$$2.5. \quad y = \frac{4x - x^2 - 4}{x}.$$

$$2.6. \quad y = \frac{x^2}{4x^2 - 1}.$$

$$2.7. \quad y = \frac{\ln x}{\sqrt{x}}.$$

$$2.8. \quad y = x + \frac{\ln x}{x}.$$

$$2.9. \quad y = x - \ln(1 + x^2).$$

$$2.10. \quad y = \frac{x^3}{x^2 - x + 1}.$$

$$2.11. \quad y = x^2 - 2 \ln x.$$

$$2.12. \quad y = x^3 e^{-x^2/2}.$$

$$2.13. \quad y = \frac{x^2 - x - 1}{x^2 - 2x}.$$

$$2.14. \quad y = \frac{(x - 2)^2}{x + 1}.$$

$$2.15. \quad y = -\ln \frac{1 + x}{1 - x}.$$

$$2.16. \quad y = \ln(x^2 + 1).$$

$$2.17. \quad y = \frac{x^2 + 6}{x^2 + 1}.$$

$$2.18. \quad y = x \ln x.$$

$$2.19. \quad y = (x - 1)e^{3x+1}.$$

$$2.20. \quad y = \frac{x^2 - 3x + 2}{x + 1}.$$

$$2.21. y = \frac{2x - 1}{(x - 1)^2}.$$

$$2.23. y = (x^3 + 4)/x^2.$$

$$2.25. y = x^3/(x^4 - 1).$$

$$2.27. y = x^2 + 1/x^2.$$

$$2.29. y = \frac{4 - 2x}{1 - x^2}.$$

$$2.22. y = \frac{x^5}{x^4 - 1}.$$

$$2.24. y = \frac{1}{3} \sqrt[3]{x^2}(x - 5).$$

$$2.26. y = (e^{2x} + 1)/e^x.$$

$$2.28. y = (5x^4 + 3)/x.$$

$$2.30. y = \frac{5x}{4 - x^2}.$$

3. Бөлінген функцияларға толық зерттеу жүргізу және олардың графиктерін құру.

$$3.1. y = e^{2x - x^2}.$$

$$3.2. y = x + \ln(x^2 - 4)$$

$$3.3. y = \frac{2(x + 1)^2}{x - 2}.$$

$$3.4. y = x \ln^2 x.$$

$$3.5. y = (4e^{x^2} - 1)/e^{x^2}.$$

$$3.6. y = x^2 e^{-x^2/2}.$$

$$3.7. y = x e^{1/x}.$$

$$3.8. y = \frac{2 + x}{(x + 1)^2}.$$

$$3.9. y = \frac{(1 - x)^3}{(x - 2)^2}.$$

$$3.10. y = x e^x.$$

$$3.11. y = x^2 e^{1/x}.$$

$$3.12. y = x^2/(x + 2)^2.$$

$$3.13. y = (x + 2)e^{1-x}.$$

$$3.14. y = \frac{\ln x}{x}.$$

$$3.15. y = \left(\frac{x - 2}{x + 1}\right)^2.$$

$$3.16. y = \frac{x^3}{9 - x^3}.$$

$$3.17. y = (x + 1)e^{2x}.$$

$$3.18. y = 4x/(4 + x^2).$$