

ИДЗ-4

Вычислить сумму данного ряда.

$$1.1. \sum_{n=1}^{\infty} \frac{1}{n^2 + n}.$$

$$1.2. \sum_{n=1}^{\infty} \frac{3^n + 2^n}{6^n}.$$

$$1.3. \sum_{n=1}^{\infty} \frac{1}{(2n+1)(2n+3)}.$$

$$1.4. \sum_{n=1}^{\infty} \frac{3^n - 2^n}{4^n}.$$

$$1.5. \sum_{n=1}^{\infty} \frac{1}{(3n-1)(3n+2)}.$$

$$1.6. \sum_{n=1}^{\infty} \frac{5^n - 2^n}{10^n}.$$

$$1.7. \sum_{n=1}^{\infty} \frac{1}{(5n-1)(5n+4)}.$$

$$1.8. \sum_{n=1}^{\infty} \frac{4^n - 3^n}{12^n}.$$

$$1.9. \sum_{n=1}^{\infty} \frac{1}{(2n-1)(2n+3)}.$$

$$1.10. \sum_{n=1}^{\infty} \frac{4^n + 3^n}{12^n}.$$

$$1.11. \sum_{n=1}^{\infty} \frac{1}{(3n-1)(3n+5)}.$$

$$1.12. \sum_{n=1}^{\infty} \frac{5^n + 2^n}{10^n}.$$

$$1.13. \sum_{n=1}^{\infty} \frac{1}{(4n-3)(4n+5)}.$$

$$1.14. \sum_{n=1}^{\infty} \frac{5^n + 4^n}{20^n}.$$

$$1.15. \sum_{n=1}^{\infty} \frac{1}{(n+1)(n+4)}.$$

$$1.16. \sum_{n=1}^{\infty} \frac{5^n - 4^n}{20^n}.$$

$$1.17. \sum_{n=1}^{\infty} \frac{1}{(n+1)(n+3)}.$$

$$1.18. \sum_{n=1}^{\infty} \frac{7^n + 3^n}{21^n}.$$

$$1.19. \sum_{n=1}^{\infty} \frac{1}{(4n-1)(4n+5)}.$$

$$1.20. \sum_{n=1}^{\infty} \frac{7^n - 3^n}{21^n}.$$

$$1.21. \sum_{n=1}^{\infty} \frac{1}{(n+3)(n+4)}.$$

$$1.22. \sum_{n=1}^{\infty} \frac{8^n - 3^n}{24^n}.$$

$$1.23. \sum_{n=1}^{\infty} \frac{1}{(3n-1)(3n+2)}.$$

$$1.24. \sum_{n=1}^{\infty} \frac{8^n + 3^n}{24^n}.$$

$$1.25. \sum_{n=1}^{\infty} \frac{1}{(2n+1)(2n+3)}.$$

$$1.26. \sum_{n=1}^{\infty} \frac{9^n + 2^n}{18^n}.$$

$$1.27. \sum_{n=1}^{\infty} \frac{1}{(2n+3)(2n+5)}.$$

$$1.28. \sum_{n=1}^{\infty} \frac{9^n - 2^n}{18^n}.$$

$$1.29. \sum_{n=1}^{\infty} \frac{1}{(n+5)(n+7)}.$$

$$1.30. \sum_{n=1}^{\infty} \frac{4^n - 3^n}{5^n}.$$

2.

Проверить сходимость ряды

$$2.1. \sum_{n=1}^{\infty} \frac{3^n (n+2)!}{n^5}.$$

$$2.2. \sum_{n=1}^{\infty} \frac{3n-1}{7^n (2n+1)!}$$

$$2.5. \sum_{n=1}^{\infty} \frac{n^n}{2^n (n+1)!}.$$

$$2.6. \sum_{n=1}^{\infty} n \sin \frac{2\pi}{3^n}.$$

$$2.7. \sum_{n=1}^{\infty} (3n+1) \operatorname{tg} \frac{\pi}{3^n}.$$

$$2.8. \sum_{n=1}^{\infty} \frac{1 \cdot 4 \cdot 7 \cdot \dots \cdot (3n-2)}{2 \cdot 3 \cdot 4 \cdot \dots \cdot (n+1)}.$$

$$2.9. \sum_{n=1}^{\infty} n^3 \operatorname{tg} \frac{2\pi}{5^n}.$$

$$2.10. \sum_{n=1}^{\infty} \frac{7^n (3n-1)}{(2n+1)!}$$

$$2.11. \sum_{n=1}^{\infty} \frac{n^n}{(n+1)!}$$

$$2.12. \sum_{n=1}^{\infty} \frac{(n+2)!}{n^n}$$

$$2.13. \sum_{n=1}^{\infty} \frac{5^n}{4(n+1)!}$$

$$2.14. \sum_{n=1}^{\infty} \frac{1 \cdot 4 \cdot 7 \cdot \dots \cdot (3n-2)}{2 \cdot 7 \cdot 12 \cdot \dots \cdot (5n-3)}.$$

$$2.15. \sum_{n=1}^{\infty} \frac{(2n+1)!}{2^n (n+1)}.$$

$$2.16. \sum_{n=1}^{\infty} \frac{(2n-1)^3}{(2n)!}.$$

$$2.17. \sum_{n=1}^{\infty} \frac{(2n^2-1)}{(n+2)!}.$$

$$2.3. \sum_{n=1}^{\infty} \frac{3^{n-1}}{7^n n^7}.$$

$$2.4. \sum_{n=1}^{\infty} \frac{(2n-1)!}{3^n (2n+1)}.$$

$$2.18. \sum_{n=1}^{\infty} \frac{3n-1}{\sqrt{5^n (2n+1)}}.$$

$$2.19. \sum_{n=1}^{\infty} \frac{4n+1}{\sqrt{n \cdot 5^n}}.$$

$$2.20. \sum_{n=1}^{\infty} (3n-1) \sin \frac{\pi}{4^n}.$$

$$2.21. \sum_{n=1}^{\infty} \frac{2n+1}{\sqrt{n \cdot 2^n}}.$$

$$2.22. \sum_{n=1}^{\infty} \frac{1 \cdot 5 \cdot 9 \cdot \dots \cdot (4n-3)}{1 \cdot 4 \cdot 7 \cdot \dots \cdot (3n-2)}.$$

$$2.23. \sum_{n=1}^{\infty} \frac{1 \cdot 4 \cdot 7 \cdot \dots \cdot (3n-2)}{n^2 (n+2)!}.$$

$$2.24. \sum_{n=1}^{\infty} \frac{1 \cdot 4 \cdot 7 \cdot \dots \cdot (3n-2)}{2^n (n+3)!}.$$

$$2.25. \sum_{n=1}^{\infty} \frac{3^n}{5^n (3n+1)}.$$

$$2.26. \sum_{n=1}^{\infty} \frac{(n+1)!}{2(2n+1)!}.$$

$$2.27. \sum_{n=1}^{\infty} \frac{5^n (4n-3)}{1 \cdot 4 \cdot 7 \cdot \dots \cdot (3n-2)}$$

$$2.28. \sum_{n=1}^{\infty} \frac{(2n-1)!}{3^n (2n+1)}.$$

$$2.29. \sum_{n=1}^{\infty} \frac{(n^2+1)}{(n+2)!}$$

$$2.30. \sum_{n=1}^{\infty} \frac{3^n}{2^n (2n+1)}$$

3.

Исследовать сходимость ряды

$$3.1. \sum_{n=1}^{\infty} \frac{2^n}{((n+1)/n)^n}.$$

$$3.2. \sum_{n=1}^{\infty} \left(\frac{5n-1}{5n} \right)^{n^2}.$$

$$3.3. \sum_{n=1}^{\infty} \operatorname{arctg}^n \frac{1}{2n+1}.$$

$$3.7. \sum_{n=1}^{\infty} 2^n (n/(n+1))^{n^2}.$$

$$3.8. \sum_{n=1}^{\infty} 3^n (n/(n+1))^{n^2}.$$

$$3.9. \sum_{n=1}^{\infty} \left(\frac{n^2+5n+3}{3n^2-2} \right)^n.$$

$$3.4. \sum_{n=1}^{\infty} \arcsin^{3n} \frac{1}{2^n}.$$

$$3.5. \sum_{n=1}^{\infty} \frac{1}{\ln^n(n+2)}.$$

$$3.6. \sum_{n=1}^{\infty} \operatorname{arctg}^n \frac{1}{5^n}.$$

$$3.13. \sum_{n=1}^{\infty} \left(\frac{n^2 + 2n + 3}{2n^2 + 1} \right)^n.$$

$$3.14. \sum_{n=1}^{\infty} \left(\frac{3n-1}{3n} \right)^{n^2}.$$

$$3.15. \sum_{n=1}^{\infty} \left(\frac{2n^2 + 3}{3n^2 + 1} \right)^n.$$

$$3.16. \sum_{n=1}^{\infty} \operatorname{arctg}^n \sqrt{\frac{n+1}{3n-1}}.$$

$$3.17. \sum_{n=1}^{\infty} \left(\frac{5n+1}{5n} \right)^{n^2}.$$

$$3.18. \sum_{n=1}^{\infty} \frac{3^n}{((n+1)/n)^n}.$$

$$3.19. \sum_{n=1}^{\infty} \left(\frac{n+1}{5n} \right)^n.$$

$$3.20. \sum_{n=1}^{\infty} \frac{n^n}{3^n}.$$

$$3.10. \sum_{n=1}^{\infty} \frac{4^n}{((n+1)/n)^{n^2}}.$$

$$3.11. \sum_{n=1}^{\infty} \operatorname{arctg}^n \frac{\sqrt{3n+2}}{n+1}.$$

$$3.12. \sum_{n=1}^{\infty} \arcsin^n \frac{n}{2n+1}.$$

$$3.23. \sum_{n=1}^{\infty} \operatorname{arctg}^n \frac{\sqrt{3n+2}}{n+1}.$$

$$3.24. \sum_{n=1}^{\infty} \arcsin^n \sqrt{\frac{n+1}{2n+1}}.$$

$$3.25. \sum_{n=1}^{\infty} \frac{((n+1)/n)^n}{3^n}.$$

$$3.26. \sum_{n=1}^{\infty} \frac{2^n}{\ln^n(n+2)}.$$

$$3.27. \sum_{n=1}^{\infty} \frac{1}{n^n} \cdot \left(\frac{3}{2} \right)^n.$$

$$3.28. \sum_{n=1}^{\infty} \left(\frac{2n+1}{5n-1} \right)^n.$$

$$3.29. \sum_{n=1}^{\infty} \arccos^n \frac{n+1}{2n+1}.$$

$$3.30. \sum_{n=1}^{\infty} \left(\frac{3n+1}{5n+1} \right)^n.$$

4.

Исследовать сходимость рядов (абсолютная, условная)

$$4.1. \sum_{n=1}^{\infty} \frac{(-1)^n n}{2n^2 + 1}.$$

$$4.2. \sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{2n^2 + 1}}.$$

$$4.3. \sum_{n=1}^{\infty} \frac{(-1)^{n+1} n}{6n-1}.$$

$$4.4. \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\sqrt{n^3 + 1}}.$$

$$4.5. \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\ln(n+1)}.$$

$$4.6. \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^2 + 1}.$$

$$4.7. \sum_{n=1}^{\infty} (-1)^{n+1} \operatorname{tg} \frac{\pi}{4\sqrt{n}}.$$

$$4.8. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{n^2}{n^3 + 4}.$$

$$4.9. \sum_{n=1}^{\infty} (-1)^{n-1} n \ln \left(1 + \frac{1}{n^2} \right).$$

$$4.10. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{2n}{n^2 + 4}.$$

$$4.11. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{2^n}{n^2 + 4}.$$

$$4.12. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{n+3}{5^n + 4}.$$

$$4.13. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{2n+1}{5n(n+1)}.$$

$$4.14. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{3n}{\sqrt{n^2 + 9}}.$$

$$4.15. \sum_{n=1}^{\infty} (-1)^{n+1} \operatorname{tg} \frac{\pi}{3\sqrt[3]{n^2}}.$$

$$4.16. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{2n-1}{n(n+1)}.$$

$$4.17. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{\sqrt{n^2+4}}.$$

$$4.18. \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{(n+1) \ln(n+1)}.$$

$$4.19. \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{(n+1) \ln^2(n+1)}.$$

$$4.20. \sum_{n=1}^{\infty} (-1)^{n-1} \frac{3^n}{(2n+1)^n}.$$

$$4.21. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{n+5}{3^n}.$$

$$4.22. \sum_{n=1}^{\infty} (-1)^{n+1} \sin \frac{\pi}{2\sqrt{n}}.$$

$$4.23. \sum_{n=1}^{\infty} (-1)^{n-1} \frac{3^n}{(2n+1)!}.$$

$$4.24. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{n^2}{4^n}.$$

$$4.25. \sum_{n=1}^{\infty} (-1)^{n-1} \frac{3}{(2n+1)!}.$$

$$4.26. \sum_{n=1}^{\infty} (-1)^{n-1} \frac{3n!}{(2n+1)!}.$$

$$4.27. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{2n+1}{n(n+1)}.$$

$$4.28. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{\sqrt{n^3+4}}.$$

$$4.29. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{n^2}{2^n}.$$

$$4.30. \sum_{n=1}^{\infty} (-1)^{n-1} \frac{1}{(3n+1)!}.$$

5.

Найти область сходимости рядов.

$$5.1. \sum_{n=1}^{\infty} \frac{x^n}{\sqrt{n^2+9}}.$$

$$5.2. \sum_{n=1}^{\infty} \frac{(x-5)^n}{n \cdot 3^n}.$$

$$5.3. \sum_{n=1}^{\infty} \frac{(x-3)^n}{(n+1) \ln(n+1)}.$$

$$5.4. \sum_{n=1}^{\infty} (-1)^n \frac{(x-3)^n}{n \cdot 5^n}.$$

$$5.5. \sum_{n=1}^{\infty} (-1)^n \frac{(x-2)^n}{2n \cdot 4^n}.$$

$$5.6. \sum_{n=1}^{\infty} \frac{(3x-2)^n}{n - \ln^2 n}.$$

$$5.7. \sum_{n=1}^{\infty} \frac{x^n}{(n+1) \ln^2(n+1)}.$$

$$5.8. \sum_{n=1}^{\infty} \frac{(x+2)^{2n}}{n \cdot 4^n}.$$

$$5.9. \sum_{n=1}^{\infty} \frac{(x+2)^{2n-1}}{(2n-1) \cdot (2n-1)!}$$

$$5.13. \sum_{n=1}^{\infty} \frac{2^n x^n}{\sqrt{2n+1}}.$$

$$5.14. \sum_{n=1}^{\infty} \frac{5^n x^n}{(2n+1) \sqrt{3^n}}.$$

$$5.15. \sum_{n=1}^{\infty} \frac{3^n x^n}{(2n+1)^2 \sqrt{3^n}}.$$

$$5.16. \sum_{n=1}^{\infty} \frac{5^n (x+1)^n}{n^n}.$$

$$5.17. \sum_{n=1}^{\infty} \frac{3^n (x+2)^n}{n^2}.$$

$$5.18. \sum_{n=1}^{\infty} \frac{3^n (x+2)^n}{(2n+1) \sqrt{2^n}}.$$

$$5.19. \sum_{n=1}^{\infty} \frac{5^n (x+3)^n}{n^2+1}.$$

$$5.20. \sum_{n=1}^{\infty} \frac{\sqrt{n} x^n}{n!}.$$

$$5.21. \sum_{n=1}^{\infty} \frac{(5n-2)(x-3)^n}{(n^2+1) \cdot 2^{n+1}}.$$

$$5.10. \sum_{n=1}^{\infty} \frac{(x-1)^n}{2^n \ln(n+1)}.$$

$$5.11. \sum_{n=1}^{\infty} \frac{2^n x^n}{n^2 + 1}.$$

$$5.12. \sum_{n=1}^{\infty} (-1)^{n-1} \frac{n! x^n}{n^n}.$$

$$5.22. \sum_{n=1}^{\infty} \frac{(x+5)^{2n-1}}{2n \cdot 4^n}.$$

$$5.23. \sum_{n=1}^{\infty} \left(\frac{n}{n+1} \right)^{n^2} \frac{x^n}{3^n}.$$

$$5.24. \sum_{n=1}^{\infty} \frac{3^n x^n}{\sqrt{2n-1}}.$$

$$5.25. \sum_{n=1}^{\infty} \frac{4^n (x+1)^n}{(n+1)!}.$$

$$5.29. \sum_{n=1}^{\infty} (nx)^n$$

$$5.26. \sum_{n=1}^{\infty} (-1)^n \frac{(x+1)^{2n-1}}{(2n-1) \cdot (2n-1)!}.$$

$$5.30. \sum_{n=1}^{\infty} n! x^n$$

$$5.27. \sum_{n=1}^{\infty} \frac{\sqrt{n^3} (x-2)^n}{n!}.$$

$$5.28. \sum_{n=1}^{\infty} \left(\frac{n}{n+1} \right)^{n^2} \frac{x^n}{2^n}$$

6.

Разложить функцию $f(x)$ в ряд Тейлора или Маклорена

$$6.1. f(x) = x^3 \arctg x, x_0 = 0$$

$$6.2. f(x) = \cos \frac{3x^2}{5}, x_0 = 0.$$

$$6.3. f(x) = \frac{2}{1-3x^2}, x_0 = 0.$$

$$6.4. f(x) = x \cos \sqrt{x}, x_0 = 0.$$

$$6.5. f(x) = \frac{1}{x^2 - 4x + 3}, x_0 = 0.$$

$$6.6. f(x) = \ln(5x+3), x_0 = -\frac{2}{5}.$$

$$6.7. f(x) = \sin \frac{\pi x}{6}, x_0 = 3.$$

$$6.8. f(x) = \frac{1}{2x+5}, x_0 = 3.$$

$$6.9. f(x) = \frac{1}{x^2 - 4x + 3}, x_0 = -2.$$

$$6.10. f(x) = \frac{1}{(x-3)^2}, x_0 = 1.$$

$$6.11. f(x) = e^{2x}, x_0 = 1.$$

$$6.12. f(x) = \frac{1}{\sqrt{e^x}}, x_0 = 0.$$

$$\mathbf{6.13.} \ f(x) = 2^{-x^2}, \ x_0 = 0.$$

$$\mathbf{6.14.} \ f(x) = shx, \ x_0 = 0.$$

$$\mathbf{6.15.} \ f(x) = 5^x, \ x_0 = 0.$$

$$\mathbf{6.16.} \ f(x) = \frac{1}{x}, \ x_0 = -2.$$

$$\mathbf{6.17.} \ f(x) = \ln(3x + 4), \ x_0 = -1.$$

$$\mathbf{6.18.} \ f(x) = \frac{1}{\sqrt{4+x}}, \ x_0 = -3.$$

$$\mathbf{6.19.} \ f(x) = \ln \frac{1}{x^2 - 2x + 2}, \ x_0 = 1.$$

$$\mathbf{6.20.} \ f(x) = \sqrt{x}, \ x_0 = 4.$$

$$\mathbf{6.21.} \ f(x) = \sin^2 2x, \ x_0 = 0.$$

$$\mathbf{6.22.} \ f(x) = \cos^2 2x, \ x_0 = 0.$$

$$\mathbf{6.23.} \ f(x) = \sqrt{1+x^2}, \ x_0 = 0.$$

$$\mathbf{6.24.} \ f(x) = \sqrt[3]{1+x^3}, \ x_0 = 0.$$

$$\mathbf{6.25.} \ f(x) = \frac{1}{x}, \ x_0 = 3.$$

$$\mathbf{6.26.} \ f(x) = \cos \frac{\pi x}{4}, \ x_0 = 2.$$

$$\mathbf{6.27.} \ f(x) = x^2 e^{2x}, \ x_0 = 0.$$

$$\mathbf{6.28.} \ f(x) = \frac{1}{x+3}, \ x_0 = -2.$$

$$\mathbf{6.29.} \ f(x) = \cos x, \ x_0 = a.$$

$$\mathbf{6.30.} \ f(x) = ch(2x^3), \ x_0 = 0.$$

**Разложить в ряд Фурье в указанном интервале (a,b) периодическую
функции f(x) периодом T**

7.1. $f(x) = |x| + 1, \quad (-\pi; \pi), \quad T = 2\pi.$

7.2. $f(x) = x^2 + 1, \quad (-2; 2), \quad T = 4.$

7.3. $f(x) = \begin{cases} 0, & \text{agar } -\pi < x < 0 \text{ bo'lsa,} \\ x+1, & \text{agar } 0 \leq x < \pi \text{ bo'lsa.} \end{cases} \quad T=2\pi.$

7.4. $f(x) = x - 1, \quad (-2; 2), \quad T = 4.$

7.5. $f(x) = 2 + |x|, \quad (-1; 1), \quad T = 2.$

7.6. $f(x) = \frac{\pi - x}{2}, \quad (-\pi; \pi), \quad T = 2\pi.$

7.7. $f(x) = |x| - 2, \quad (-\pi; \pi), \quad T = 2\pi.$

7.8. $f(x) = \begin{cases} -2x, & \text{agar } -\pi < x < 0 \text{ bo'lsa,} \\ 1, & \text{agar } 0 \leq x \leq \pi \text{ bo'lsa.} \end{cases} \quad T = 2\pi.$

7.9. $f(x) = x + 1, \quad (-\pi; \pi), \quad T = 2\pi.$

7.10. $f(x) = x^2 + 1, \quad (0; 2\pi), \quad T = 2\pi.$

7.11. $f(x) = \begin{cases} -x, & \text{agar } -\pi < x < 0 \text{ bo'lsa,} \\ 0, & \text{agar } 0 \leq x < \pi \text{ bo'lsa.} \end{cases} \quad T = 2\pi.$

$$7.12. \quad f(x) = \begin{cases} 1, & \text{agar } -1 < x < 0 \text{ bo'lsa,} \\ 3, & \text{agar } 0 \leq x \leq 1 \text{ bo'lsa.} \end{cases} \quad T = 2.$$

$$7.13. \quad f(x) = \sin \frac{x}{2}, \quad (-\pi; \pi), \quad T = 2\pi.$$

$$7.14. \quad f(x) = \begin{cases} 0, & \text{agar } -\pi < x \leq 0 \text{ bo'lsa,} \\ 1+x, & \text{agar } 0 < x \leq \pi \text{ bo'lsa.} \end{cases} \quad T = 2\pi.$$

$$7.15. \quad f(x) = \begin{cases} -1, & \text{agar } -\pi < x < 0 \text{ bo'lsa,} \\ 2, & \text{agar } 0 \leq x \leq \pi \text{ bo'lsa.} \end{cases} \quad T = 2\pi.$$

$$7.16. \quad f(x) = \begin{cases} 0, & \text{agar } -2 < x < 0 \text{ bo'lsa,} \\ 3, & \text{agar } 0 \leq x \leq 2 \text{ bo'lsa.} \end{cases} \quad T = 4.$$

$$7.17. \quad f(x) = x^2, \quad (-1; 1), \quad T = 2.$$

$$7.18. \quad f(x) = \begin{cases} \cos x, & \text{agar } -\frac{\pi}{2} < x < \frac{\pi}{2} \text{ bo'lsa,} \\ 0, & \text{agar } \frac{\pi}{2} \leq x \leq \frac{3\pi}{2} \text{ bo'lsa.} \end{cases} \quad T = 2\pi.$$

$$7.19. \quad f(x) = |x| + x^2, \quad (-\pi; \pi), \quad T = 2\pi.$$

$$7.20. \quad f(x) = \begin{cases} 1, & \text{agar } -2 < x < 0 \text{ bo'lsa,} \\ -2, & \text{agar } 0 \leq x \leq 2 \text{ bo'lsa.} \end{cases} \quad T = 4.$$

$$7.21. \quad f(x) = \begin{cases} x-2, & \text{agar } -\pi < x < 0 \text{ bo'lsa,} \\ 2x, & \text{agar } 0 \leq x \leq \pi \text{ bo'lsa.} \end{cases} \quad T = 2\pi.$$

$$7.22. \quad f(x) = \cos \frac{x}{2}, \quad (-\pi; \pi), \quad T = 2\pi.$$

$$7.23. \quad f(x) = \frac{\pi^2}{12} - \frac{x^2}{4}, \quad (-\pi; \pi), \quad T = 2\pi.$$

$$7.24. \quad f(x) = \begin{cases} \pi, & \text{agar } -\pi < x < 0 \text{ bo'lsa,} \\ x, & \text{agar } 0 \leq x \leq \pi \text{ bo'lsa.} \end{cases} \quad T = 2\pi.$$

$$7.25. \quad f(x) = -x|x|, \quad (-1; 1), \quad T = 2.$$

$$7.26. \quad f(x) = 3 - |x|, \quad (-1; 1), \quad T = 2.$$

$$7.27. \quad f(x) = \begin{cases} x-1, & \text{agar } -\pi < x < 0 \text{ bo'lsa,} \\ 3x, & \text{agar } 0 \leq x \leq \pi \text{ bo'lsa.} \end{cases} \quad T = 2\pi.$$

$$7.28. \quad f(x) = \cos \frac{3x}{2}, \quad \left(-\frac{\pi}{2}; \frac{\pi}{2}\right), \quad T = \pi.$$

$$7.29. \quad f(x) = |x| - x^2, \quad (-\pi; \pi), \quad T = 2\pi.$$

$$7.30. \quad f(x) = x^2 + 1, \quad (-\pi; \pi), \quad T = 2\pi.$$