Distance Learning. Higher Mathematics.
ASSIGNMENTS.
Period: 3 April 2020 – 24 April 2020

	Variant
Абдалла Омар Айман Мохамед Хелмі	1
Адардур Омар	2
Аіт Убелкасем Аюб	3
Гечмен Деніз Арин	4
Денлі Анил Джем	5
Ель Хаддаді Аюб	6
Йілдіз Мірхан Мерт	7
Кияган Ідріс	8
Мохамед Ахмед	9
Онйеквере-Діке Окечукву Чуквуемека	10
Рахад КМ Сефатуллах	11
Халім Ахмед Хішам Фікрі	12
Хамед Ахмед Реда Юссіф	13
Чакир Хакан	14

The control tasks to the chapter 7

Task 1. Calculate the definite integrals:

7.1.1. $\int_{-2}^{0}(x+2)^2\cos 3x\,dx$; 7.1.2. $\int_{0}^{1}\frac{x+1}{x^2+6x+9}dx$; 7.1.3. $\int_{0}^{4}x^2\sqrt{16-x^2}\,dx$;

7.1.4. $\int_{0}^{2}\frac{x}{1+x+x^2}\,dx$; 7.1.5. $\int_{0}^{2\pi}(3-7x^2)\cos 2x\,dx$; 7.1.6. $\int_{0}^{\frac{\pi}{2}}x^2\sin x\,dx$;

7.1.7. $\int_{0}^{3}(x^2-3x)\sin 2x\,dx$; 7.1.8. $\int_{0}^{\frac{\pi}{4}}\frac{dx}{1+2\sin^2 x}$; 7.1.9. $\int_{1}^{4}x\ln x\,dx$;

7.1.10. $\int_{0}^{1}x\sqrt{1-x^2}\,dx$; 7.1.11. $\int_{1}^{3}\frac{\ln^2 x}{\sqrt[3]{x^2}}dx$; 7.1.12. $\int_{1}^{2}x\ln(1+x)dx$;

7.1.13. $\int_{1}^{e^2}\frac{\ln^2 x}{\sqrt{x}}\,dx$; 7.1.14. $\int_{0}^{\frac{\pi}{2}}\frac{\sin 2x}{1+\cos^2 x}dx$; 7.1.15. $\int_{1}^{e}\sqrt{x}\ln^2 x\,dx$;

7.1.16. $\int_{0}^{\frac{\pi}{4}}tg^2 x\,dx$; 7.1.17. $\int_{2}^{3}(x-1)^2\ln(x-1)dx$; 7.1.18. $\int_{0}^{\pi}\cos^2 x\,dx$;

7.1.19. $\int_{-1}^{0}(x+2)\ln^2(x+2)dx$; 7.1.20. $\int_{0}^{4}\frac{\sqrt{x}+1}{\sqrt{x}+2}dx$; 7.1.21. $\int_{-1}^{1}x^2e^{\frac{-x}{2}}\,dx$;

7.1.22. $\int_{-2}^{0}x^3\sqrt{x^2+9}dx$; 7.1.23. $\int_{0}^{1}x^2e^{3x}dx$; 7.1.24. $\int_{\frac{\sqrt{2}}{2}}^{1}\frac{\sqrt{1-x^2}}{x^2}\,dx$;

7.1.25. $\int_{0}^{1}\frac{4arctgx-x}{1+x^2}\,dx$; 7.1.26. $\int_{0}^{1}\frac{x}{x^2+3x+2}dx$; 7.1.27. $\int_{0}^{\frac{\pi}{4}}\frac{4-7tgx}{2+3tgx}\,dx$;

7.1.28. $\int_{0}^{1}xe^{-2x}dx$; 7.1.29. $\int_{1}^{e}\frac{x^2+\ln x^2}{x}dx$; 7.1.30. $\int_{0}^{\pi}x\sin x\,dx$;

Task 2. Calculate the definite integrals.

7.2.1. $\int_0^1 \frac{\left(x^2+1\right)dx}{\left(x^3+3x+1\right)^3}$

7.2.2. $\int_0^2 \frac{x^3}{x^2+4}dx$

7.2.3. $\int_0^{\pi/4} \frac{2\cos x+3\sin x}{(3\cos x-2\sin x)^3}dx$

7.2.4. $\int_{\sqrt{3}}^{\sqrt{8}} \frac{x-2/x}{\sqrt{1+x^2}}dx$

7.2.5. $\int_0^{\sqrt{3}} \frac{2arctgx+x}{1+x^2}dx$

7.2.6. $\int_0^1 \frac{x^3}{x^2+1}dx$

7.2.7. $\int_1^3 \frac{1-\sqrt{x}}{\sqrt{x}(x+1)}dx$

7.2.8. $\int_1^e \frac{1+\ln x}{x}dx$

7.2.9. $\int_1^e \frac{x^2+\ln x^2}{x}dx$

7.2.10. $\int_0^1 \frac{x^3}{\left(x^2+1\right)^2}dx$

7.2.11. $\int_{e+1}^{e^2+1} \frac{4+ln(x-1)}{x-1}dx$

7.2.12. $\int_0^1 \frac{3arctgx+x}{x^2+1}dx$

7.2.13. $\int_\pi^{2\pi} \frac{x+\cos x}{x^2+2\sin x}dx$

7.2.14. $\int_0^{1/2} \frac{8x+arctg2x}{4x^2+1}dx$

7.2.15. $\int_0^1 \frac{xdx}{x^4+1}$

7.2.16. $\int_{\sqrt{3}}^{\sqrt{8}} \frac{x-1/x}{\sqrt{1+x^2}}dx$

7.2.17. $\int_0^{sin1} \frac{(arcsin x)^2-2}{\sqrt{1-x^2}}dx$

7.2.18. $\int_{\sqrt{3}}^{\sqrt{8}} \frac{dx}{x\sqrt{1+x^2}}$

7.2.19. $\int_0^1 \frac{xdx}{\sqrt{1+x^2+x^4}}$

7.2.20. $\int_{\sqrt{2}}^2 \frac{dx}{x\sqrt{x^2-1}}$

7.2.21. $\int_1^4 \frac{1/\left(2\sqrt{x}\right)+1}{\left(\sqrt{x}+x\right)^2}dx$

7.2.22. $\int_0^{\sqrt{3}} \frac{2x+arctg^3x}{1+x^2}dx$

7.2.23. $\int_{\sqrt{2}}^{\sqrt{3}} \frac{xdx}{\sqrt{x^4-x^2-1}}$

7.2.24. $\int_{\pi/4}^{\pi/2} \frac{\sin x+x\cos x}{(x\sin x)^2}dx$

7.2.25. $\int_\pi^{2\pi} \frac{1-\cos x}{(x-\sin x)^2}dx$

7.2.26. $\int_{-1}^0 \frac{tg^2(x+1)}{\cos^2(x+1)}dx$

7.2.27. $\int_2^9 \frac{xdx}{\sqrt[3]{x-1}}$

7.2.28. $\int_0^{\pi/4} tgx \cdot \ln\cos x dx$

7.2.29. $\int_0^{\pi/4} \frac{\sin x - \cos x}{(\cos x + \sin x)^4} dx$

7.2.30. $\int_0^1 \frac{x^3 + x}{x^4 + 1} dx$

Task 3. Calculate the definite integrals.

7.3.1. $\int_0^{\pi/4} \frac{dx}{\cos x(1+\cos x)}$

7.3.2. $\int_0^{\pi/2} \frac{\sin x dx}{3 + 2\sin x}$

7.3.3. $\int_0^{\pi/2} \frac{\sin x dx}{2 + \cos x}$

7.3.4. $\int_0^{\pi/4} \frac{dx}{(1+\sin x + \cos x)^2}$

7.3.5. $\int_{\pi/2}^{2arctg2} \frac{dx}{\sin x(1+\sin x)}$

7.3.6. $\int_0^{2\pi/3} \frac{\cos^2 x dx}{(1+\cos x + \sin x)^2}$

7.3.7. $\int_0^{\pi/2} \frac{\sin^2 x dx}{(1+\cos x + \sin x)^2}$

7.3.8. $\int_{-\pi/2}^{0} \frac{\sin x dx}{(1+\cos x - \sin x)^2}$

7.3.9. $\int_{-2\pi/3}^{0} \frac{\cos^2 x dx}{(1+\cos x - \sin x)^2}$

7.3.10. $\int_0^{\pi/2} \frac{\sin x dx}{(1+\sin x)^2}$

7.3.11. $\int_0^{\pi/2} \frac{\sin x dx}{(1+\cos x + \sin x)^2}$

7.3.12. $\int_0^{\pi/2} \frac{\cos x dx}{(1+\cos x + \sin x)^2}$

7.3.13. $\int_0^{2arctg(1/2)} \frac{(1-\sin x)dx}{\cos x(1+\cos x)}$

7.3.14. $\int_{-2\pi/3}^{0} \frac{\cos x dx}{(1+\cos x - \sin x)}$

7.3.15. $\int_{-\pi/2}^{0} \frac{\cos x dx}{(1+\cos x - \sin x)^2}$

7.3.16. $\int_0^{2arctg(1/3)} \frac{\cos x dx}{(1+\cos x)(1-\sin x)}$

7.3.17. $\int_0^2 \frac{\cos x dx}{(1+\cos x + \sin x)}$

7.3.18. $\int_0^{\pi/2} \frac{\sin x dx}{(1+\cos x + \sin x)}$

7.3.19. $\int_{\pi/3}^{\pi/2} \frac{\cos x dx}{(1-\cos x + \sin x)}$

7.3.20. $\int_0^{\pi/2} \frac{\sin x dx}{5 + 4\sin x}$

7.3.21. $\int\limits_{2arctg(1/3)}^{2arctg(1/2)} \frac{dx}{\sin x(1-\sin x)}$

7.3.22. $\int\limits_{0}^{\pi/2} \frac{\cos x - \sin x}{(1+\sin x)^2}dx$

7.3.23. $\int\limits_{\pi/2}^{2arctg\,2} \frac{dx}{\sin^2 x(1+\cos x)}$

7.3.24. $\int\limits_{\pi/2}^{2arctg\,2} \frac{dx}{\sin^2 x(1-\cos x)}$

7.3.25. $\int\limits_{2arctg(1/2)}^{\pi/2} \frac{\cos x dx}{(1-\cos x)^3}$

7.3.26. $\int\limits_{0}^{\pi/2} \frac{\cos x - \sin x}{(1+\cos x)^2}dx$

7.3.27. $\int\limits_{2arctg(1/2)}^{\pi/2} \frac{dx}{(1+\sin x-\cos x)^2}$

7.3.28. $\int\limits_{0}^{2\pi/3} \frac{1+\sin x}{(1+\cos x+\sin x)}dx$

7.3.29. $\int\limits_{0}^{2arctg(1/2)} \frac{1+\sin x}{(1-\sin x)^2}dx$

7.3.30. $\int\limits_{0}^{\pi/2} \frac{1+\cos x}{(1+\sin x+\cos x)}dx$

Task 4. Calculate the definite integrals.

7.4.1. $\int\limits_{0}^{\pi/4} \frac{2tg^2 x - tgx + 2}{3-tgx}dx$

7.4.2. $\int\limits_{0}^{arccos\sqrt{2/3}} \frac{(2+tgx)dx}{\sin^2 x + 2\cos^2 x - 3}$

7.4.3. $\int\limits_{\pi/4}^{arctg\,3} \frac{4tgx-3}{4\cos^2 x + 1 - \sin 2x}dx$

7.4.4. $\int\limits_{arccos\,4/\sqrt{17}}^{\pi/4} \frac{(1+2ctgx)dx}{(2\sin x+\cos x)^2}$

7.4.5. $\int\limits_{-arctg\,1/3}^{0} \frac{(3tgx+1)dx}{1+2\sin 2x - 5\cos 2x}$

7.4.6. $\int\limits_{arcsin\,1/\sqrt{37}}^{\pi/4} \frac{tgxdx}{3\sin 2x + 5\cos^2 x}$

7.4.7. $\int\limits_{0}^{arctg\,1/3} \frac{(8+tgx)dx}{9\sin^2 x + \cos^2 x}$

7.4.8. $\int\limits_{\pi/4}^{arctg\,3} \frac{dx}{(3tgx+5)\sin 2x}$

7.4.9. $\int\limits_{0}^{arccos\,1/\sqrt{7}} \frac{(3+2tgx)dx}{\sin^2 x + 3\cos^2 x - 1}$

7.4.10. $\int\limits_{0}^{arccos\,1/\sqrt{6}} \frac{(3tg^2 x - 1)dx}{tg^2 x + 5}$

7.4.11. $\int\limits_{arccos\,1/\sqrt{10}}^{arccos\,1/\sqrt{26}} \frac{dx}{(6+5tgx)\sin 2x}$

7.4.12. $\int\limits_{-arcsin\,2/\sqrt{5}}^{\pi/4} \frac{(2-tgx)dx}{(\sin x + 3\cos x)^2}$

7.4.13. $\int\limits_{\pi/4}^{arccos\,1/\sqrt{26}} \frac{dx}{(6-tgx)\sin 2x}$

7.4.14. $\int\limits_{-arccos\,1/\sqrt{5}}^{0} \frac{(7-3tgx)dx}{tgx+3}$

7.4.15. $\int_{\pi/4}^{arcsin2/\sqrt{5}} \frac{(4tgx-5)dx}{4\cos^2 x-\sin 2x+1}$

7.4.16. $\int_{-arccos1/\sqrt{10}}^{0} \frac{(3tg^2 x-50)dx}{2tgx+7}$

7.4.17. $\int_{0}^{\pi/4} \frac{(3+tgx)dx}{(\sin x+2\cos x)^2}$

7.4.18. $\int_{0}^{arctg2/3} \frac{(4+tgx)dx}{5\sin^2 x+3\cos^2 x}$

7.4.19. $\int_{0}^{arctg3} \frac{(2+tgx)dx}{\sin^2 x+9\cos^2 x}$

7.4.20. $\int_{\pi/4}^{arccos1/\sqrt{3}} \frac{tgxdx}{\sin^2 x-5\cos^2 x+4}$

7.4.21. $\int_{\pi/4}^{arcsin\sqrt{2/3}} \frac{tgxdx}{7\sin^2 x+\cos^2 x}$

7.4.22. $\int_{0}^{\pi/4} \frac{(2-3tgx)dx}{2+3tgx}$

7.4.23. $\int_{0}^{arcsin3/\sqrt{10}} \frac{(2tgx-5)dx}{(4\cos x-\sin x)^2}$

7.4.24. $\int_{0}^{arcsin\sqrt{7/8}} \frac{\sin^2 xdx}{2+3\cos 2x}$

7.4.25. $\int_{0}^{\pi/4} \frac{(3tgx+2)dx}{\sin 2x+5}$

7.4.26. $\int_{arcsin2/\sqrt{5}}^{arcsin3/\sqrt{10}} \frac{(2+tgx)dx}{(5-tgx)\sin 2x}$

7.4.27. $\int_{0}^{arcsin\sqrt{3/7}} \frac{tgx^2 dx}{3\sin^2 x+4\cos^2 x-7}$

7.4.28. $\int_{0}^{arctg2} \frac{(11-tgx)dx}{3\sin^2 x+\cos^2 x}$

7.4.29. $\int_{0}^{\pi/4} \frac{\sin^2 xdx}{3\cos 2x-4}$

7.4.30. $\int_{\pi/4}^{arctg3} \frac{(1+ctgx)dx}{(\sin x+2\cos x)^2}$

Task 5. Calculate the definite integrals.

7.5.1. $\int_{2}^{4} \frac{\sqrt{x^2-4}}{x^4}dx$

7.5.2. $\int_{3}^{6} \frac{\sqrt{x^2-9}}{x^4}dx$

7.5.3. $\int_{0}^{2} \frac{dx}{\left(16-x^2\right)^{3/2}}$

7.5.4. $\int_{-3}^{3} x^2\sqrt{9-x^2}dx$

7.5.5. $\int_{\sqrt{2}}^{2\sqrt{2}} \frac{\sqrt{x^2-2}}{x^4}dx$

7.5.6. $\int_{0}^{3} \sqrt{9-x^2}dx$

7.5.7. $\int_{0}^{9/2} \frac{x^2}{\sqrt{81-x^2}}dx$

7.5.8. $\int_{0}^{2} \frac{dx}{\left(4+x^2\right)^{3/2}}$

7.5.9. $\int_0^2 \frac{x^2}{\sqrt{16-x^2}}\,dx$

7.5.10. $\int_0^{\sqrt{3}} \frac{dx}{\left(4-x^2\right)^{3/2}}$

7.5.11. $\int_1^2 \frac{\sqrt{x^2-1}}{x^4}\,dx$

7.5.12. $\int_0^3 \frac{dx}{\left(9+x^2\right)^{3/2}}$

7.5.13. $\int_0^2 x^2\sqrt{4-x^2}\,dx$

7.5.14. $\int_0^4 \sqrt{16-x^2}\,dx$

7.5.15. $\int_0^3 \frac{dx}{\left(9+x^2\right)^{3/2}}$

7.5.16. $\int_0^{\sqrt{5}/2} \frac{dx}{\left(5-x^2\right)^{3/2}}$

7.5.17. $\int_0^{1/\sqrt{2}} \frac{x^4}{\sqrt{\left(1-x^2\right)^3}}\,dx$

7.5.18. $\int_0^1 \frac{x^4\,dx}{\left(2-x^2\right)^{3/2}}$

7.5.19. $\int_0^{\sqrt{3}} \sqrt{3-x^2}\,dx$

7.5.20. $\int_0^{\sqrt{2}} x^2\sqrt{2-x^2}\,dx$

7.5.21. $\int_0^7 x^2\sqrt{49-x^2}\,dx$

7.5.22. $\int_0^{4\sqrt{3}} \frac{dx}{\left(64-x^2\right)^{3/2}}$

7.5.23. $\int_0^{2/\sqrt{2}} \frac{x^4\,dx}{\left(16-x^2\right)\sqrt{16-x^2}}$

7.5.24. $\int_1^{\sqrt{3}} \frac{dx}{\sqrt{\left(1+x^2\right)^3}}$

7.5.25. $\int_0^2 \frac{x^4}{\sqrt{\left(8-x^2\right)^3}}\,dx$

7.5.26. $\int_0^1 \sqrt{4-x^2}\,dx$

7.5.27. $\int_0^{3/2} \frac{x^2}{\sqrt{9-x^2}}\,dx$

7.5.28. $\int_0^{\sqrt{2}/2} \frac{dx}{\left(1-x^2\right)\sqrt{1-x^2}}$

7.5.29. $\int_0^1 \frac{x^2}{\sqrt{4-x^2}}\,dx$

7.5.30. $\int_0^{\sqrt{2}} \frac{x^4\,dx}{\left(4-x^2\right)^{3/2}}$

Task 6. Calculate areas of the figures, restricted by the following curves.

7.6.1. $x = \dfrac{1}{y\sqrt{1+\ln y}}, \quad y = e^3, \quad y = 1, \quad x = 0;$

7.6.2. $y = \dfrac{1}{x^2} e^{1/x}, \quad y = 0, \quad x = 1, \quad x = 2;$

7.6.3. $y = x^2\sqrt{16 - x^2}, \quad (0 \le x \le 4), \quad y = 0;$

7.6.4. $x = \sqrt{4 - y^2}, \quad x = 0, \quad y = 0, \quad y = 1;$

7.6.5. $y = x^2 \cos x, \quad x = 0, \quad y = 0, \quad x = \pi/2;$

7.6.6. $x = 4 - (y-1)^2, \quad x = y^2 - 4y + 3;$

7.6.7. $y = x\sqrt{9 - x^2}, \quad (0 \le x \le 3), \quad y = 0;$

7.6.8. $y = \sin x \cos^2 x, \quad (0 \le x \le \pi/2), \quad y = 0;$

7.6.9. $y = x^2\sqrt{4 - x^2}, \quad (0 \le x \le 2), \quad y = 0;$

7.6.10. $y = \sqrt{e^x - 1}, \quad x = \ln 2, \quad y = 0;$

7.6.11. $y = \arccos x, \quad x = 0, \quad y = 0;$

7.6.12. $y = 2x - x^2 + 3, \quad y = x^2 - 4x + 3;$

7.6.13. $x = \arccos y, \quad x = 0, \quad y = 0;$

7.6.14. $y = x^2\sqrt{8 - x^2}, \quad (0 \le x \le 2\sqrt{2}), \quad y = 0;$

7.6.15. $y = x\sqrt{1 - x^2}, \quad (0 \le x \le 1), \quad y = 0;$

7.6.16. $y = \dfrac{1}{1 + \cos x}, \quad x = -\pi/2, \quad x = \pi/2, \quad y = 0;$

7.6.17. $y = \sin 2x \cos^3 x, \quad (0 \le x \le \pi/2), \quad y = 0;$

7.6.18. $x = 4 - y^2, \quad x = y^2 - 2y;$

7.6.19. $y = 4 - x^2, \quad y = x^2 - 2x;$

7.6.20. $y = \sqrt{4 - x^2}, \quad (0 \le x \le 1), \quad y = 0;$

7.6.21. $y = \sin x \cos^2 x, \quad (0 \le x \le \pi/2), \quad y = 0;$

7.6.22. $y = 2x - x^2 + 3, \quad y = x^2 - 4x + 3;$

7.6.23. $y = (x-2)^3, \quad y = 4x - 8;$

7.6.24. $y = (x+1)^2, \quad y^2 = x + 1;$

7.6.25. $y = x\sqrt{49 - x^2}, \quad (0 \le x \le 7), \quad y = 0;$

7.6.26. $y = x\,arctgx, \quad x = \sqrt{3}, \quad y = 0;$

7.6.27. $x = \sqrt{e^y - 1}, \quad x = 0, \quad y = \ln 2;$

7.6.28. $y = \dfrac{x}{1 + \sqrt{x}}, \quad x = 1, \quad y = 0;$

7.6.29. $x = (y-2)^3, \quad x = 4y - 8;$

7.6.30. $y = \dfrac{x}{(x^2 + 1)^2}, \quad x = 1, \quad y = 0;$

Task 7. Calculate areas of the figures, restricted by the curves, given by equations in parametric form.

7.7.1. $\begin{cases} x = 4\sqrt{2}\cos^3 t \\ y = \sqrt{2}\sin^3 t \end{cases}$
$x = 2 \quad (x \ge 2)$

7.7.2. $\begin{cases} x = 4(t - \sin t) \\ y = 4(1 - \cos t) \end{cases}$
$y = 6, (0 < x < 8\pi, y \ge 6)$

7.7.3. $\begin{cases} x = 3\cos t \\ y = 8\sin t \end{cases}$
$y = 4\sqrt{3} \quad (y \ge 4\sqrt{3})$

7.7.4. $\begin{cases} x = 32\cos^3 t \\ y = 3\sin^3 t \end{cases}$
$x = 12\sqrt{3} \quad (x \ge 12\sqrt{3})$

7.7.5. $\begin{cases} x = 8(t - \sin t) \\ y = 8(1 - \cos t) \end{cases}$
$y = 12, (0 < x < 16\pi, y \ge 4\sqrt{3})$

7.7.6. $\begin{cases} x = 2\sqrt{2}\cos t \\ y = 5\sqrt{2}\sin t \end{cases}$
$y = 5 \quad (y \ge 5)$

7.7.7. $\begin{cases} x = 2(t - \sin t) \\ y = 2(1 - \cos t) \end{cases}$
$y = 2, (0 < x < 4\pi, y \ge 2)$

7.7.8. $\begin{cases} x = 9\cos t \\ y = 4\sin t \end{cases}$
$y = 2 \quad (y \ge 2)$

7.7.9. $\begin{cases} x = 24\cos^3 t \\ y = 2\sin^3 t \end{cases}$
$x = 9\sqrt{3} \quad (x \geq 9\sqrt{3})$

7.7.10. $\begin{cases} x = t - \sin t \\ y = 1 - \cos t \end{cases}$
$y = 1, (0 < x < 2\pi, y \geq 1)$

7.7.11. $\begin{cases} x = 8\cos^3 t \\ y = 8\sin^3 t \end{cases}$
$x = 1 \quad (x \geq 1)$

7.7.12. $\begin{cases} x = \sqrt{2}\cos t \\ y = 4\sqrt{2}\sin t \end{cases}$
$y = 4 \quad (y \geq 4)$

7.7.13. $\begin{cases} x = 2\sqrt{2}\cos^3 t \\ y = \sqrt{2}\sin^3 t \end{cases}$
$x = 1 \quad (x \geq 1)$

7.7.14. $\begin{cases} x = 6\cos t \\ y = 4\sin t \end{cases}$
$y = 2\sqrt{3} \quad (y \geq 2\sqrt{3})$

7.7.15. $\begin{cases} x = 6(t - \sin t) \\ y = 6(1 - \cos t) \end{cases}$
$y = 6, (0 < x < 12\pi, y \geq 6)$

7.7.16. $\begin{cases} x = 32\cos^3 t \\ y = \sin^3 t \end{cases}$
$x = 4 \quad (x \geq 4)$

7.7.17. $\begin{cases} x = 2\sqrt{2}\cos t \\ y = 3\sqrt{2}\sin t \end{cases}$
$y = 3 \quad (y \geq 3)$

7.7.18. $\begin{cases} x = 3(t - \sin t) \\ y = 3(1 - \cos t) \end{cases}$
$y = 3, (0 < x < 6\pi, y \geq 3)$

7.7.19. $\begin{cases} x = 16\cos^3 t \\ y = \sin^3 t \end{cases}$
$x = 6\sqrt{3} \quad (x \geq 6\sqrt{3})$

7.7.20. $\begin{cases} x = 2\cos t \\ y = 6\sin t \end{cases}$
$y = 3 \quad (y \geq 3)$

7.7.21. $\begin{cases} x = 4(t - \sin t) \\ y = 4(1 - \cos t) \end{cases}$
$y = 4, (0 < x < 8\pi, y \geq 4)$

7.7.22. $\begin{cases} x = 4\sqrt{2}\cos^3 t \\ y = 2\sqrt{2}\sin^3 t \end{cases}$
$x = 2 \quad (x \geq 2)$

7.7.23. $\begin{cases} x = 10(t - \sin t) \\ y = 10(1 - \cos t) \end{cases}$
$y = 15, (0 < x < 20\pi, y \geq 15)$

7.7.24. $\begin{cases} x = 8\cos^3 t \\ y = 4\sin^3 t \end{cases}$
$x = 3\sqrt{3} \quad (x \geq 3\sqrt{3})$

7.7.25. $\begin{cases} x = 3\cos t \\ y = 8\sin t \end{cases}$
$y = 4 \quad (y \geq 4)$

7.7.26. $\begin{cases} x = 6(t - \sin t) \\ y = 6(1 - \cos t) \end{cases}$
$y = 9, (0 < x < 12\pi, y \geq 9)$

7.7.27. $\begin{cases} x = 8\sqrt{2}\cos^3 t \\ y = \sqrt{2}\sin^3 t \end{cases}$
$x = 4 \quad (x \geq 4)$

7.7.28. $\begin{cases} x = 6\cos t \\ y = 2\sin t \end{cases}$
$y = \sqrt{3} \quad (y \geq \sqrt{3})$

7.7.29. $\begin{cases} x = 2(t - \sin t) \\ y = 2(1 - \cos t) \end{cases}$
$y = 3, (0 < x < 4\pi, y \geq 3)$

7.7.30. $\begin{cases} x = 16\cos^3 t \\ y = 2\sin^3 t \end{cases}$
$x = 2 \quad (x \geq 2)$

Task 8. Calculate areas of the figures, restricted by the following curves, given by equations in polar coordinates.

7.8.1. $\rho = \sin 3\varphi$

7.8.2. $\rho = \cos 3\varphi$

7.8.3. $\rho = \cos 2\varphi$

7.8.4. $\rho = 4\sin 3\varphi, \rho = 2, (\rho \geq 2)$

$\rho = \sin\varphi, \rho = \sqrt{2}\cos(\varphi - \pi/4)$

7.8.5. $\left(0 \leq \varphi \leq \frac{3}{4}\pi\right)$
$\rho = \sqrt{2}\cos(\varphi - \pi/4),$

7.8.6. $\rho = \frac{1}{2} + \sin\varphi$

7.8.7. $\rho = \sqrt{2}\sin(\varphi - \pi/4),$
$\left(\frac{\pi}{4} \leq \varphi \leq \frac{3}{4}\pi\right)$

7.8.8. $\rho = \frac{1}{2} + \cos\varphi$

7.8.9. $\rho = \sin\varphi, \rho = 2\sin\varphi$

7.8.10. $\rho = \frac{5}{2}\sin\varphi, \rho = \frac{3}{2}\sin\varphi$

7.8.11. $\rho = 2\cos 4\varphi$

7.8.12. $\rho = \cos\varphi, \rho = 3\cos\varphi$

7.8.13. $\rho = 4\sin 4\varphi$

7.8.14. $\rho = \cos\varphi - \sin\varphi$

7.8.15. $\rho = 4\sin\varphi, \rho = 2\sin\varphi$

7.8.16. $\rho = 12\sin\varphi, \rho = 25\sin\varphi$

7.8.17. $\rho = 3\cos 6\varphi$

7.8.18. $\rho = \cos\varphi + \sin\varphi$

7.8.19. $\rho = \frac{5}{2}\cos\varphi, \rho = \frac{3}{2}\cos\varphi$

7.8.20. $\rho = 2\sin 6\varphi$

7.8.21. $\rho = 1 + \sqrt{3}\cos\varphi$

7.8.22. $\rho = 1 + \sqrt{2}\sin\varphi$
$\rho = \sin\varphi, \rho = \cos\varphi$

7.8.23. $\rho = 2\cos\varphi, \rho = 5\cos\varphi$

7.8.24. $\left(0 \leq \varphi \leq \frac{\pi}{2}\right)$

$\rho = cos\,\varphi,$

7.8.25. $\rho = 6\,cos\,3\varphi, \rho = 3, (\rho \geq 3)$

7.8.26. $\rho = \sqrt{2}\,cos(\varphi - \pi/4), \left(-\frac{\pi}{4} \leq \varphi \leq \frac{\pi}{2}\right)$

7.8.27. $\rho = 2\,cos\,3\varphi, \rho = 1, (\rho \geq 1)$

$\rho = 2\sqrt{3}\,sin\,\varphi, \rho = 2\,cos\,\varphi$

7.8.28. $\rho = 6\,sin\,3\varphi, \rho = 3, (\rho \geq 3)$

$\rho = \sqrt{3}\,cos\,\varphi, \rho = sin\,\varphi$

7.8.29. $\left(0 \leq \varphi \leq \frac{\pi}{2}\right)$

7.8.30. $\left(0 \leq \varphi \leq \frac{\pi}{2}\right)$

$\rho = cos\,\varphi,$

.8.25. $\rho = 6\,cos\,3\varphi, \rho = 3, (\rho \geq 3)$

7.8.26. $\rho = \sqrt{2}\,cos(\varphi - \pi/4), \left(-\frac{\pi}{4} \leq \varphi \leq \frac{\pi}{2}\right)$

7.8.27. $\rho = 2\,cos\,3\varphi, \rho = 1, (\rho \geq 1)$

$\rho = 2\sqrt{3}\,sin\,\varphi, \rho = 2\,cos\,\varphi$

7.8.28. $\rho = 6\,sin\,3\varphi, \rho = 3, (\rho \geq 3)$

$\rho = \sqrt{3}\,cos\,\varphi, \rho = sin\,\varphi$

7.8.29. $\left(0 \leq \varphi \leq \frac{\pi}{2}\right)$

7.8.30. $\left(0 \leq \varphi \leq \frac{\pi}{2}\right)$

Task 9. Calculate the length of arcs of the following curves, given by equations in rectangular coordinates.

7.9.1. $y = ln\frac{5}{2x}, \quad \sqrt{3} \leq x \leq \sqrt{8}$

7.9.2. $y = e^x + 6, \quad ln\sqrt{8} \leq x \leq ln\sqrt{15}$

7.9.3. $y = 1 - ln\,cos\,x, \quad 0 \leq x \leq \frac{\pi}{6}$

7.9.4.

$y = \sqrt{1 - x^2} + arcsin\,x, \quad 0 \leq x \leq \frac{7}{9}$

7.9.5. $y = ln(x^2 - 1), \quad 2 \leq x \leq 3$

7.9.6. $y = -ln\,cos\,x, \quad 0 \leq x \leq \frac{\pi}{6}$

7.9.7. $y = arcsin\,x - \sqrt{1 - x^2}, \quad 0 \leq x \leq \frac{15}{16}$

7.9.8. $y = 2 + chx, \quad 0 \leq x \leq 1$

7.9.9. $y = ln(1 - x^2), \quad 0 \leq x \leq \frac{1}{4}$

7.9.10. $y = 2 + arcsin\sqrt{x} + \sqrt{x - x^2}, \quad \frac{1}{4} \leq x \leq 1$

7.9.11. $y = 1 - ln\left(x^2 - 1\right), \quad 3 \le x \le 4$ 7.9.12. $y = \left(1 - e^x - e^{-x}\right)/2, \quad 0 \le x \le 3$

7.9.13. $y = 4 + arccos\sqrt{x} - \sqrt{x - x^2}, \quad 0 \le x \le \frac{1}{2}$ 7.9.14. $y = e^x + e, \quad ln\sqrt{3} \le x \le ln\sqrt{15}$

7.9.15. $y = ln\frac{7}{4} - ln\, x, \quad \sqrt{3} \le x \le \sqrt{8}$ 7.9.16. $y = 2 + ln\cos x, \quad 0 \le x \le \frac{\pi}{6}$

7.9.17. $y = \left(e^{2x} + e^{-2x} + 3\right)/4, \quad 0 \le x \le 2$ 7.9.18. $y = 3 + chx, \quad 0 \le x \le 1$

7.9.19. $y = 1 + arcsin\, x - \sqrt{1 - x^2}, \quad 0 \le x \le \frac{3}{4}$ 7.9.20. $y = e^x + 7, \quad ln\sqrt{8} \le x \le ln\sqrt{24}$

7.9.21. $y = ln\sin x, \quad \frac{\pi}{3} \le x \le \frac{\pi}{2}$ 7.9.22. $y = -arccos\, x + \sqrt{1 - x^2} + 2, \quad 0 \le x \le \frac{9}{16}$

7.9.23. $y = -arccos\sqrt{x} - \sqrt{x - x^2} + 5, \quad \frac{1}{9} \le x \le 1$ 7.9.24. $y = 1 - ln\sin x, \quad \frac{\pi}{3} \le x \le \frac{\pi}{2}$

7.9.25. $y = e^x - 2, \quad ln\sqrt{3} \le x \le ln\sqrt{8}$ 7.9.26. $y = ln\, x, \quad \sqrt{3} \le x \le \sqrt{15}$

7.9.27. $y = \frac{x^2}{4} - \frac{ln\, x}{2}, \quad 1 \le x \le 2$ 7.9.28. $y = 6 - e^x, \quad ln\sqrt{8} \le x \le ln\sqrt{15}$

7.9.29. $y = 3 + \left(e^x + e^{-x}\right)/2, \quad 0 \le x \le 2$ 7.9.30. $y = 1 - ln\cos x, \quad 0 \le x \le \frac{\pi}{6}$

Task 10. Calculate the length of arcs of the following curves, given by equations in polar coordinates.

7.10.1. $\rho = 2(1 - sin\,\varphi), \quad -\frac{\pi}{4} \le \varphi \le 0$ 7.10.2. $\rho = 3(1 + sin\,\varphi), \quad 0 \le \varphi \le \frac{\pi}{2}$

7.10.3. $\rho = 4(1 - cos\,\varphi), \quad -\frac{\pi}{2} \le \varphi \le -\frac{\pi}{4}$ 7.10.4. $\rho = 12e^{12\varphi/5}, \quad 0 \le \varphi \le \frac{\pi}{3}$

7.10.5. $\rho = 4e^{4\varphi/3}, \quad \frac{\pi}{4} \le \varphi \le \frac{\pi}{2}$ 7.10.6. $\rho = 3(1 - cos\,\varphi), \quad -\frac{\pi}{4} \le \varphi \le 0$

7.10.7. $\rho = 21(1 + sin\,\varphi), \quad -\frac{\pi}{3} \le \varphi \le \frac{\pi}{3}$ 7.10.8. $\rho = 1 - sin\,\varphi, \quad 0 \le \varphi \le \frac{\pi}{2}$

7.10.9. $\rho = 7e^{7\varphi/12}, \quad 0 \le \varphi \le \frac{\pi}{4}$ 7.10.10. $\rho = \sqrt{3}e^{2\varphi}, \quad -\frac{\pi}{2} \le \varphi \le -\frac{\pi}{4}$

7.10.11. $\rho = \sqrt{2}e^{\varphi}, \quad 0 \le \varphi \le \frac{\pi}{2}$ 7.10.12. $\rho = 6e^{12\varphi/5}, \quad 0 \le \varphi \le \frac{\pi}{4}$

7.10.13. $\rho = 8(1 - cos\,\varphi), \quad -\frac{2\pi}{3} \le \varphi \le 0$ 7.10.14. $\rho = 3\,cos\,\varphi, \quad 0 \le \varphi \le \frac{\pi}{6}$

7.10.15. $\rho = 6\,sin\,\varphi, \quad 0 \le \varphi \le \frac{\pi}{2}$ 7.10.16. $\rho = 11\varphi, \quad 0 \le \varphi \le \frac{8}{7}$

7.10.17. $\rho = 3e^{3\varphi}, \quad -\frac{\pi}{4} \le \varphi \le \frac{\pi}{4}$ 7.10.18. $\rho = 7e^{7\varphi/3}, \quad 0 \le \varphi \le \frac{\pi}{3}$

7.10.19. $\rho = 2\,sin\,\varphi, \quad 0 \le \varphi \le \frac{2\pi}{3}$ 7.10.20. $\rho = 3\varphi, \quad 0 \le \varphi \le \frac{4}{7}$

7.10.21. $\rho = 5(1 - \cos\varphi), \quad -\frac{\pi}{3} \le \varphi \le 0$ 7.10.22. $\rho = a\,sin^3\frac{\varphi}{3}, \quad 0 \le \varphi \le \frac{\pi}{2}$

7.10.23. $\rho = a\varphi, \quad 0 \le \varphi \le 2\pi$ 7.10.24. $\rho = a(1 + cos\,\varphi), \quad 0 \le \varphi \le 2\pi$

7.10.25. $\rho = \frac{1}{\varphi}, \quad \frac{1}{2} \le \varphi \le 2$ 7.10.26. $\rho = a\sec^2\frac{\varphi}{2}, \quad 0 \le \varphi \le \frac{\pi}{2}$

7.10.27. $\rho = 4\varphi, \quad 0 \le \varphi \le \frac{3}{4}$ 7.10.28. $\rho = 6\,cos\,\varphi, \quad 0 \le \varphi \le \frac{\pi}{4}$

7.10.29. $\rho = \sqrt{3}e^{2\varphi}, \quad -\frac{\pi}{3} \le \varphi \le \frac{\pi}{3}$ 7.10.30. $\rho = 2e^{4\varphi/3}, \quad -\frac{\pi}{2} \le \varphi \le \frac{\pi}{2}$

Task 11. Calculate the volume of the figures, restricted by the following surfaces.

7.11.1. $\frac{x^2}{4} + \frac{y^2}{9} + \frac{z^2}{64} = 1, \quad z = 0, \quad z = 4$

7.11.2. $\frac{x^2}{25} + \frac{y^2}{9} - z^2 = 1, \quad z = 0, z = 2$

7.11.3. $\frac{x^2}{27} + y^2 = 1, z = \frac{y}{\sqrt{3}}, z = 0, (y \ge 0)$

7.11.4. $z = x^2 + 9y^2, \quad z = 6$

7.11.5. $z = x^2 + 3y^2, \quad z = 1$

7.11.6. $\frac{x^2}{16}+\frac{y^2}{9}+\frac{z^2}{196}=1, \quad z=0, \quad z=6$

7.11.7. $\frac{x^2}{25}+\frac{y^2}{9}+\frac{z^2}{25}=1, z=0, z=3$

7.11.8. $\frac{x^2}{9}+y^2=1, \quad z=y, z=0, (y\geq 0)$

7.11.9. $z=x^2+3y^2, \quad z=1$

7.11.10. $\frac{x^2}{9}+\frac{y^2}{4}-z^2=1, \quad z=0, \quad z=3$

7.11.11. $\frac{x^2}{25}+\frac{y^2}{9}-\frac{z^2}{100}=-1, \quad z=20$

7.11.12. $z=x^2+9y^2, \quad z=4$

7.11.13. $\frac{x^2}{27}+\frac{y^2}{25}=1, z=\frac{y}{\sqrt{3}}, z=0, (y\geq 0)$

7.11.14. $x^2+\frac{y^2}{4}-z^2=1, z=0, z=3$

7.11.15. $\frac{x^2}{4}+\frac{y^2}{16}+\frac{z^2}{25}=1, z=-2, z=3$

7.11.16. $z=7x^2+4y^2, \quad z=3$

7.11.17. $\frac{x^2}{49}+\frac{y^2}{25}-z^2=1, z=0, z=7$

7.11.18. $\frac{x^2}{4}+\frac{y^2}{25}+\frac{z^2}{9}=1, z=2, z=0$

7.11.19. $z=9x^2+y^2, \quad z=3$

7.11.20. $\frac{x^2}{9}+\frac{y^2}{16}-\frac{z^2}{64}=-1, \quad z=16$

7.11.21. $z=x^2+9y^2, \quad z=4$

7.11.22. $\frac{x^2}{81}+\frac{y^2}{25}-z^2=1, z=2, z=-1$

7.11.23. $x^2+y^2=4, z=y, z=0, (y\geq 0)$

7.11.24. $\frac{x^2}{4}+y^2-z^2=1, \quad z=3, \quad z=-1$

7.11.25. $\frac{x^2}{24}+\frac{y^2}{9}+\frac{z^2}{16}=1, \quad z=3, \quad z=0$

7.11.26. $\frac{x^2}{4}+\frac{y^2}{9}-\frac{z^2}{36}=-1, \quad z=7$

7.11.27. $\frac{x^2}{3}+\frac{y^2}{16}=1, z=y\sqrt{3}, z=0, (y\geq 0)$

7.11.28. $z=2x^2+7y^2, \quad z=7$

7.11.29. $x=2y^2+18z^2, \quad x=3$

7.11.30. $y=x^2+9z^2, \quad y=2$