I. Плоская область D ограничена заданными линиями.
1) Сделайте схематический рисунок области D.
2) С помощью двойного интеграла найдите площадь области D.

1. $y = 2/(x^2+1),\ y = \sqrt{x},\ x = -\sqrt{y}$.

2. $y = 2x - 6,\ x = 3 - \sqrt{y},\ y = \log_2 x$.

3. $y = x^3,\ x + y = 2,\ y = 3x + 2$ при $x + y \leq 2$.

4. $y = \sqrt{x+1},\ x - y = 1,\ x + y = -1$.

5. $y = 2^x,\ x = -\sqrt{2y},\ x + 2y = 2$.

6. $y = \sqrt{x+2},\ x = \sqrt{2y},\ y = -x$.

7. $y = 0,5^x,\ y - x = 1,\ y + 4x = -4$.

8. $x = \sqrt{y} - 1,\ x = \sqrt{1-y},\ y = x^2 - 1$.

9. $x = \sqrt{2-y},\ y = -\sqrt{2x},\ y = x$.

10. $y = \sqrt[3]{x},\ x = -\sqrt{y+2},\ y = 3x - 2$.

11. $y = -x^3,\ y - x = 2,\ x\sqrt{3} = \sqrt{2-y}$ при $y \geq -x^3$.

12. $y - x = 1,\ x + y = -1,\ x = \sqrt{y+1}$.

13. $y = 4^x,\ y = (x-1)^2,\ x = \dfrac{2}{\sqrt{y}}$.

14. $y = \sqrt{-x},\ x = \sqrt{y},\ y = \dfrac{2}{x^2+1}$.

15. $x + y = 1,\ y = 2^x,\ 4x - y = 4$.

16. $y = \sqrt{4-x},\ x + y = -2,\ x = \sqrt{2y} - 2$.

17. $y = \sqrt{2-x},\ x = -\sqrt{2y},\ y = x$.

18. $x = \sqrt{2y},\ y = 0,5^x,\ 2y - x = 2$.

19. $y = \sqrt[3]{x},\ x + y = 2,\ y\sqrt{3} = -\sqrt{2-x}$ при $y \leq \sqrt[3]{x}$.

20. $x = \sqrt{1-y},\ y - x = 1,\ y + x = -1$.

23. $4y - x = 4, y = \log_2 x, x + y = 1.$ 24. $x = -\sqrt{y}, y = \sqrt{x}, y = 2 - x.$

25. $y = \log_2 x, y = -\sqrt{2x}, 2x + y = 2.$ 26. $x = \arcsin y, y = \dfrac{\pi}{2x}, y = \dfrac{8x}{\pi}$
при $x \geq 0$

27. $x = y^3, x = 1 - \sqrt{y+1}, x + y = 2.$ 28. $y = 2^x, x + y = 3, x + 3y = 3.$

29. $y = \sqrt{x}, x + y = 2, x - y = 2.$ 30. $y = 4^{-x}, y = (x+1)^2, x = -\dfrac{2}{\sqrt{y}}.$

II. Тело T ограничено заданными поверхностями.
1) Сделайте схематический рисунок тела T.
2) С помощью тройного интеграла найдите объем тела T, перейдя к цилиндрическим или сферическим координатам.

1. $z = 2 + \sqrt{4 - x^2 - y^2}, z = \sqrt{x^2 + y^2}, x = 0$ при $x \leq 0$.

2. $z + 4 = x^2 + y^2, 9z = 5(x^2 + y^2), y = 0$ при $y \geq 0$.

3. $3z^2 = x^2 + y^2, z^2 = 3(x^2 + y^2), x^2 + y^2 + z^2 = 9$ при $z \geq 0$.

4. $x^2 + y^2 = z^2 - 5, \dfrac{z^2}{9} = \dfrac{x^2 + y^2}{4}, x = 0$ при $z \geq 0, x \geq 0$.

5. $\dfrac{z^2}{9} = 1 - \dfrac{x^2 + y^2}{25}, x^2 + y^2 = 9, z = 0, x = 0$ при $z \geq 0, x \leq 0$.

6. $z = 4 - 2\sqrt{x^2 + y^2}, z = \dfrac{x^2 + y^2}{2} - 2, y = 0$ при $y \geq 0$.

7. $z = \dfrac{5}{3}\sqrt{9 - x^2 - y^2}, z = \dfrac{5}{4}\sqrt{x^2 + y^2}, x = 0$ при $x \leq 0$.

8. $x^2 + y^2 + z^2 = 4, x^2 + y^2 + (z-2)^2 = 4$ при $0 \leq z \leq 2$.

9. $z = \sqrt{4 - x^2 - y^2}, z = \sqrt{x^2 + y^2} - 2, x = 0$ при $x \geq 0$.

10. $z = 4 - x^2 - y^2, 9z = -5(x^2 + y^2), y = 0$ при $y \leq 0$.

11. $z = 2 - \sqrt{x^2 + y^2}, z = 4 - x^2 - y^2, x = 0$ при $x \leq 0$.

12. $z^2 = 3(x^2 + y^2),\ x^2 + y^2 + z^2 = 2z,\ x = 0$ при $x \geq 0,$

$0 \leq z \leq \sqrt{3(x^2 + y^2)}$.

13. $x^2 + y^2 + 4z^2 = 4,\ x^2 + y^2 = 1,\ x = 0, z = 0$ при $x^2 + y^2 \geq 1,$

$x \leq 0$.

14. $2z = 4 - x^2 - y^2,\ z = 2\sqrt{x^2 + y^2} - 4,\ y = 0$ при $y \geq 0,\ z \geq -4$.

15. $z = \sqrt{x^2 + y^2},\ z + 2 = x^2 + y^2,\ x = 0$ при $x \leq 0$.

16. $x^2 + y^2 + z^2 = 9,\ x^2 + y^2 + z^2 = 2\sqrt{3}z,\ x = 0, z = 0$ при $x \geq 0,$

$0 \leq 2\sqrt{3}z \leq x^2 + y^2 + z^2$.

17. $z = -\sqrt{4 - x^2 - y^2},\ z = 2 - \sqrt{x^2 + y^2},\ y = 0$ при $y \geq 0,\ z \leq 2$.

18. $z = x^2 + y^2,\ z = \dfrac{5}{9}(x^2 + y^2) + 4,\ y = 0$ при $y \leq 0$.

19. $z = 2 - x^2 - y^2,\ z = -\sqrt{x^2 + y^2},\ x = 0$ при $x \geq 0$.

20. $z^2 = x^2 + y^2,\ x^2 + y^2 + z^2 = 4z,\ x = 0$ при $x \leq 0,$

$z \geq \sqrt{x^2 + y^2}$.

21. $4x^2 + 4y^2 + z^2 = 36,\ x^2 + y^2 = 4,\ y = 0, z = 0$ при

$y \geq 0, z \leq 0,\ x^2 + y^2 \geq 4$.

22. $z = -2\sqrt{x^2 + y^2},\ 2(z + 6) = x^2 + y^2,\ y = 0$ при $y \leq 0$.

23. $z = \sqrt{x^2 + y^2 + 9},\ 4z = 5\sqrt{x^2 + y^2},\ y = 0$ при $y \geq 0$.

24. $3z^2 = x^2 + y^2,\ z^2 = 3(x^2 + y^2),\ x^2 + y^2 + z^2 = 4z,\ x = 0$ при

$x \geq 0,\ z \geq 0$.

25. $z = 2 - \sqrt{4 - x^2 - y^2},\ z = 4 - \sqrt{x^2 + y^2},\ y = 0$ при $y \leq 0$.

26. $z = -\dfrac{5}{16}(x^2 + y^2),\ z = -\sqrt{x^2 + y^2 + 9},\ y = 0$ при $y \leq 0$.

27. $x^2 + y^2 + z^2 = 9,\ x^2 + y^2 + z^2 - 2\sqrt{3}z = 0$ при $x^2 + y^2 + z^2 \geq 9$.

28. $x^2 + y^2 + z^2 = -2z,\ x^2 + y^2 + z^2 = 1$ при $x^2 + y^2 + z^2 \geq 1$.

29. $z = \dfrac{x^2 + y^2}{4} + 1,\ z = \dfrac{3(x^2 + y^2)}{4} - 1,\ x = 0, y = 0$ при

$x \geq 0, y \geq 0$.

30. $z = 3 - \dfrac{3(x^2 + y^2)}{4},\ z = 1 - \dfrac{x^2 + y^2}{4},\ x = 0, y = 0$ при

$x \leq 0, y \leq 0$.