# ФУНКЦИИ НЕСКОЛЬКИХ ПЕРЕМЕННЫХ

1. Определить тип поверхности и изобразить её на чертеже.

2. Изобразить линию, которая определяется системой уравнений.

3. Построить тело, ограниченное поверхностями.

4. Найти область задания функции $z=f(x,y)$.

5. Найти частные производные первого порядка.

6. Вычислить $dz$ и $d^2z$.

7. Найти угол между градиентами скалярных полей $u$ и $v$ в точке $M_0$ .

8. Найти производную скалярного поля в точке $M_0$ по направлению нормали к поверхности $S$ , образующей острый угол с осью $Oz$ ( или по направлению вектора $\boldsymbol{l}$ ).

9. Найти уравнения нормали и касательной плоскости к поверхности в точке $M_0$.

10. Найти экстремум функции.

11. Найти наибольшее и наименьшее значения функции в области $D$.

## -1-

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| 1. *a)* $x^2-4x+y^2-6y+z^2-2z=2$ ; *b)* $(x-1)^2+y^2=z^2$ . |
| 2. $x^2/32-y^2/18+z^2/2=1$; $z+1=0$. |
| 3. $x=0; y=0; z=0; z=y^2+1; x+1=0$. |
| 4. $z=\sqrt{25-x^2-4y^2}$ . |
| 5. $z=\dfrac{2xy}{x-y}$ ; $z=\ln(y+2\sqrt{2+x^2}$ ; $z=\cos\dfrac{xy}{1+x}\cdot\sin\dfrac{x}{y}$ ; $z=(1+3y)^{x+1}$. |
| 6. $z=\exp(x^3+2xy^2)$. |
| 7. $u=\dfrac{2}{x}+\dfrac{3}{y}-z$ ; $v=xyz,\quad M_0(1;2;-1)$. |
| 8. $u=4\ln(3+x^2)-8xyz,\ S: x^2-2y^2+2z^2=1,\ M_0(1;1;1)$. |
| 9. $x^2-y^2-z^2+2x+4z=0,\ M_0(0;1;1)$. |
| 10. $z=x^2+y^3+2xy+1$. |
| 11. $z=4x^2+4y^2-2x-3y.\qquad D:\begin{cases}x=1, y=0,\\ x-y=0.\end{cases}$ |

## -2-

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| 1. *a)* $x^2=4+z$; *b)* $x^2+y^2+z^2=8z-12$ . |
| 2. $x^2/5-y^2/4=6z$, $y+5=0$. |
| 3. $x=0; y=0; z=0; x+y=1; z=x^2+y^2$ . |
| 4. $z=\ln\left(\dfrac{x^2}{9}-\dfrac{y^2}{4}-1\right)$. |
| 5. $z=\dfrac{2x^2+y}{y^2+2x}$ ; $z=\ln\left(2x+\sqrt{1+y^2}\right)$ ; $z=\exp(-2x+y^2)$ ; $z=(1+2y)^x$. |
| 6. $z=\exp(2xy^2+1)$. |
| 7. $u=x^2yz^3$, $v=\dfrac{4\sqrt{6}}{x}-\dfrac{\sqrt{6}}{9y}+\dfrac{3}{2}$ ; $M_0\left(2;\dfrac{1}{3};\sqrt{\dfrac{3}{2}}\right)$. |
| 8. $u=\dfrac{\sqrt{x}}{y}-\dfrac{yz}{x+\sqrt{y}}$ , $\bar{l}=\{2;0;1\}$ , $M_0(4;1;-2)$. |
| 9. $x^2+y^2-x+2y+4z-13=0$, $M_0(2;1;2)$. |
| 10. $z=-x^2-y^2-\dfrac{2}{x}-\dfrac{1}{y}$. |
| 11. $z=4x^2+9y^2-4x-6y+3$, $\qquad D:\begin{cases}x=0, y=0,\\ x+y=1.\end{cases}$ |

-3-

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| 1. *a)* $z=9-y^2$ ; *b)* $x^2+6x+y^2+z^2-4z=3$ . |
| 2. $x^2+y^2=9$ , $z=x$ . |
| 3. $x^2+y^2=z^2; x^2+y^2=x; z\ge 0$ . |
| 4. $z=\arccos\dfrac{x^2+y^2}{9}$. |
| 5. $z=2xy+x^2-2y$, $z=\ln\left(2x+2\sqrt{1+y^2}\right)$ , $z=\exp(-2x+2y^2)$, $z=\sin\dfrac{x}{y}$, $z=(1+2y)^{2x}$ . |
| 6. $z=\exp(2xy^2+2)$. |
| 7. $u=\dfrac{z^3}{xy^2}$, $v=9\sqrt{2}x^3-\dfrac{y^3}{2\sqrt{2}}-\dfrac{4z^3}{\sqrt{3}}$, $M_0\left(\dfrac{1}{3};2;\sqrt{\dfrac{3}{2}}\right)$. |
| 8. $u=x\sqrt{y}+y\sqrt{z}$, $S: 4z+2x^2-y^2=0$, $M_0(2;4;4)$. |
| 9. $x^2+2y^2-3z^2+xy+yz-2xz+16=0$, $M_0(1;2;3)$. |
| 10. $z=2\ln x-(x+1)y+2$. |
| 11. $z=5x^2-3xy+y^2+4$, $D:\begin{cases}x=-1, y=-1,\\ x+y=1.\end{cases}$ |

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| 1. *a)* $y^2+z^2=x^2/2$ ; *b)* $x^2+y^2+z^2=8x$ . |
| 2. $2z=x^2+y^2/4$ , $z=2x$ . |
| 3. $x+y+z=2; x^2+y^2=1; z=0$ . |
| 4. $z=\dfrac{x}{\sqrt{y-x}}+\dfrac{y}{\sqrt{y+x}}$ . |
| 5. $z=\dfrac{x^2+y}{y^2+x}$ , $z=\ln\left(x+\sqrt{1+y^2}\right)$ , $z=\sin\dfrac{x}{y}\cdot\cos\dfrac{y}{x}$ , $z=\ln(x+\ln y)$ , $z=\sin^2\dfrac{x-1}{y}$ . |
| 6. $z=\exp(xy^2+1)$ . |
| 7. $u=\dfrac{z}{x^3y^3}$, $v=\dfrac{3}{x}+\dfrac{4}{y}-\dfrac{1}{\sqrt{6}\cdot z}$ , $M_0\left(1;2;\dfrac{1}{\sqrt{6}}\right)$. |
| 8. $u=x^2y^2z-\ln(z-1)$, $\vec{l}=\{5;-6;2\sqrt{5}\}$ , $M_0(1;1;2)$. |
| 9. $z=y+\ln\dfrac{x}{z}$ , $M_0(1;1;1)$. |
| 10. $z=\ln x-(x+1)y+1$. |
| 11. $z=10+2xy-x^2$, $D:\begin{cases}y=4-x^2,\\ y=0.\end{cases}$ |

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| 1. *a)* $x^2-z^2=0$, *b)* $x^2+y^2-4y+z^2=0$. |
| 2. $x^2+y^2+z^2-4z=0$, $z=1$ . |
| 3. $x^2+y^2=2x; z=x; z=2x$ . |
| 4. $z=\sqrt{1-x^2}+\sqrt{1-y^2}.$ |
| 5. $z=xy+x^2-3y$ ; $z=\exp(-x^2+3y^2)$ ; $z=\sin\frac{x}{3y}\cdot\cos\frac{y}{x}$ ; $z=\ln(x+3\ln y)$; $z=(1+y)^{3x}$ . |
| 6. $z=\exp(xy^2+3).$ |
| 7. $u=\frac{x^2}{yz^2}$ , $v=\frac{x^3}{2}+6y^3+3\sqrt{6}z^3$ , $M_0\left(\sqrt{2};\frac{1}{\sqrt{2}};\frac{1}{\sqrt{3}}\right)$. |
| 8. $u=-2\ln(x^2-5)-4xyz,\quad S: x^2+2y^2-2z^2=1,\quad M_0(1;1;1).$ |
| 9. $\frac{x^2}{16}+\frac{y^2}{9}-\frac{z^2}{8}=0,\quad M_0(4;3;4).$ |
| 10. $z=\ln x-(x+1)y+3.$ |
| 11. $z=4x+2y+4x^2+y^2+6,\quad D:\begin{cases}x=0, y=0,\\ x+y+2=0.\end{cases}$ |



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| 1 *a)* $z=4-y^2$ , *b)* $x^2+y^2+2x-2y-2z-2=0$. |
| 2. $x^2/27+y^2/18-z^2/9=1$, $x=3$ . |
| 3. $x^2+y^2+z^2=22z; x^2+y^2=z^2$. |
| 4. $z=1+\sqrt{1-(x-y)^2}$ . |
| 5. $z=\frac{2x^2+3y}{3y^2+2x}$ ; $z=\exp(-2x+3y^2)$; $z=(1+2y)^{3x}$; $z=\ln(2x+3\sqrt{1+y^2})$ ; $z=\sin^2\frac{2x-1}{3y}$. |
| 6. $z=\exp(2xy^2+3)$. |
| 7. $u=\frac{z^2}{xy^2}$ , $v=3\sqrt{2}x^2-\frac{y^2}{\sqrt{2}}-3\sqrt{2}z^2$ , $M_0\left(\frac{1}{3};2;\sqrt{\frac{2}{3}}\right)$. |
| 8. $u=\ln(3-x^2)+xy^2z$, $\bar{l}=\{-1;2;-2\}$, $M_0(1;3;2).$ |
| 9. $x^2y^2+2x-z^3=16$ , $M_0(2;1;2)$ . |
| 10. $z=2x^3+3y^3-3xy$ . |
| 11. $z=(x^3-3x)(2-y^2)$, $D:\begin{cases}-2\le x\le 2,\\ -1\le y\le 1.\end{cases}$ |

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| 1. *a)* $z=2x^2+3y^2$; *b)* $x^2+y^2+z\ -2x+2z+1=0$. |
| 2. $x^2/9+y^2/4+z^2/25=1$ , $y=1$. |
| 3. $x^2+z^2=1; y=x; y=0; x>0$. |
| 4. $z=\ln(x^2+y)$. |
| 5. $z=\dfrac{3x^2+y}{y^2+3x}$ ; $z=\exp(-3x+y^2)$; $z=(1+3y)^x$; $z=\ln(3x+\ln y)$; $z=arctg\sqrt{(3x)^y}$ . |
| 6. $z=\exp(3xy^2+1)$ . |
| 7. $u=\dfrac{xy^2}{z}$ , $v=6\sqrt{6}x^3-6\sqrt{6}y^3+2z^3$ , $M_0\left(\dfrac{1}{\sqrt{6}};\dfrac{1}{\sqrt{6}};1\right)$. |
| 8. $u=0.25x^2y-\sqrt{x^2+5z^2}$ , $S: z^2=x^2+4y^2-4$ , $M_0(-2;0.5;1)$. |
| 9. $z=\sin\dfrac{y}{xz}$ , $M_0(2;\pi;1)$. |
| 10. $z=3\ln x-(x+1)y+1$. |
| 11. $z=2xy$, $D: x^2+y^2\le 9$. |

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| 1. *a)* $(z-2)^2=x^2+y^2$ ; *b)* $x^2+4x+y^2-4y+z^2-2z=0$. |
| 2. $z^2=x^2+4y^2$; $z=x^2+4y^2$ . |
| 3. $x^2+y^2+z^2=R^2; x^2+y^2+z^2=2Rz$. |
| 4. $z=\dfrac{1}{\sqrt{x^2+y^2-1}}$. |
| 5. $z=\dfrac{3x^2+2y}{2y^2+3x}$ ; $z=\sin\dfrac{3x}{2y}\cdot\cos\dfrac{y}{x}$ ; $z=\sin^2\dfrac{3x-1}{2y}$ ; $z=\ln(3x+2\ln y)$ ; $z=3xy+x^2-2y$ . |
| 6. $z=\exp(3xy^2+2)$. |
| 7. $u=\dfrac{yz^2}{x}$ , $v=\dfrac{\sqrt{6}}{2x}-\dfrac{\sqrt{6}}{2y}+\dfrac{2}{3z}$ , $M_0\left(\dfrac{1}{\sqrt{2}};\dfrac{1}{\sqrt{2}};\dfrac{1}{\sqrt{3}}\right)$. |
| 8. $u=y\ln(1+x^2)-arctgz$ , $\bar{l}=\{2;-3;-2\}$, $M_0(0;1;1)$. |
| 9. $z=arctg\dfrac{x+z}{y}$ , $M_0\left(\dfrac{\pi}{4};\dfrac{\pi}{2};\dfrac{\pi}{4}\right)$ . |
| 10. $z=3x^3+y^3-3xy$. |
| 11. $z=3-2x^2-xy-y^2$ , $D:\begin{cases}x=1, y=0,\\ y=x.\end{cases}$ |

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| 1. *a)* $2z+1=x^2$ , *b)* $z=3x^2+2y^2$ . |
| 2. $x^2+y^2=z^2$ , $x^2+y^2=z$ . |
| 3. $z^2=4-y; x^2+y^2=4y$ . |
| 4. $z=\sqrt{1-(x^2+y^2)^2}$ . |
| 5. $z=3xy+x^2-3y$ ; $z=\exp(-3x+3y^2)$; $z=(1+3y)^{3x}$ ; $z=arctg\sqrt{(3x)^{3y}}$ ; $z=\ln\left(3x+3\sqrt{1+y^2}\right)$ . |
| 6. $z=\exp(3xy^2+3)$ . |
| 7. $u=\dfrac{xy^2}{z^2}$ , $v=3\sqrt{2}x^2-\dfrac{y^2}{\sqrt{2}}-3\sqrt{2}z^2$, $M_0\left(\dfrac{1}{3};2;\sqrt{\dfrac{2}{3}}\right)$. |
| 8. $u=xz^2-\sqrt{x^3y}$ , $S: x^2-y^2-3z+12=0$, $M_0(2;2;4)$. |
| 9. $x=\ln(z^2+y^2)$, $M_0(0;0;1)$. |
| 10. $z=x^3+y^3-3xy+3$ . |
| 11. $z=x^2-xy+y^2$ , $D: x^2+y^2\le 4$. |



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| 1. *a)* $x^2=y^2+z^2$ ; *b)* $y^2=6x-4$ . |
| 2. $x^2+y^2=2z$ , $x^2+y^2=1$ . |
| 3. $z=0; z=2-x; y=2\sqrt{x}; y=x^2/4$ . |
| 4. $z=\arcsin\dfrac{y}{x}$ . |
| 5. $z=\dfrac{x^2+4y}{4y^2+x}$ ; $z=\exp(-x+4y^2)$ ; $z=\cos\dfrac{y}{x}\cdot\sin\dfrac{x}{4y}$; $z=\ln\left(x+4\sqrt{1+y^2}\right)$ , $z=(1+y)^{4x}$. |
| 6. $z=\exp(xy^2+4)$ . |
| 7. $u=\dfrac{x^3y^3}{z}$ , $v=\dfrac{3}{x}+\dfrac{4}{y}-\dfrac{1}{\sqrt{6}z}$ , $M_0\left(1;2;\dfrac{1}{\sqrt{6}}\right)$ . |
| 8. $u=x+\ln(z^2+y^2)$, $\bar{l}=\{-2;1;-1\}$, $M_0(2;1;1)$. |
| 9. $y=x\cdot tg\dfrac{z}{2}$ , $M_0\left(1;2;\dfrac{\pi}{2}\right)$. |
| 10. $z=-x^3-y^3-\dfrac{1}{x}-\dfrac{4}{y}$ . |
| 11. $z=x^2+3y^2+x-y$, $D:\begin{cases}x=1, y=1,\\ x+y=1.\end{cases}$ |

## -11-

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| 1. *a)* $x^2+y^2=(z-1)^2$ ; *b)* $x^2+2x+y^2+4y+z^4=4$. |
| 2. $z=x^2+y^2$ , $z=9.$ |
| 3. $z=0; z=x^2; 2x-y=0; x+y=9.$ |
| 4. $z=\ln\frac{x}{y}$ . |
| 5. $z=\exp(-2x+4y^2)$ ; $z=(1+2y)^{4x}$; $z=\sin^2\frac{2x-1}{4y}$ ; $z=\ln(2x+4\ln y)$; $z=2xy+x^2-4y$. |
| 6. $z=\exp(2xy^2+4)$. |
| 7. $u=\frac{1}{x^2yz}$ , $v=-\frac{4\sqrt{2}}{x}+\frac{\sqrt{2}}{9y}+\frac{1}{\sqrt{3}z}$ , $M_0\left(2;\frac{1}{3};\frac{1}{\sqrt{6}}\right)$ . |
| 8. $u=x\sqrt{y}-yz^2$ , $S: x^2+y^2=4z$ , $M_0(2;2;1)$. |
| 9. $(8-z^2)x^2-4y^2=0$, $M_0(2;2;2)$. |
| 10. $z=-x^2-y^2-\frac{2}{x}-\frac{4}{y}$ |
| 11. $z=-xy$ , $D:\begin{cases}x=0, y=1,\\ y=x.\end{cases}$ |

## -12-

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| 1. *a)* $z^2+y^2+x^2=4z$ ; *b)* $x^2+2xy^2+4y+z^2=4$. |
| 2. $x^2=z$ , $y=5$. |
| 3. $x=0; z=0; y=0; x+y=1; z=x^2+3y^2$ . |
| 4. $z=\ln y-\ln\cos x$ . |
| 5. $z=3xy+x^2-4y$; $z=\exp(-3x+4y^2)$ ; $z=(1+3y)^{4x}$ ; $z=\ln\left(3x+4\sqrt{1+y^2}\right)$ ; $z=arctg(3x)^{4y}$. |
| 6. $z=\exp(3xy^2+4)$ . |
| 7. $u=\frac{x^2}{y^2z^3}$ , $v=\frac{6}{x}\frac{2}{y}-\frac{3\sqrt{3}}{2\sqrt{2}z}$ , $M_0\left(\sqrt{2};\sqrt{2};\frac{\sqrt{3}}{2}\right)$. |
| 8. $u=x^2-arctg(y+z)$ , $\bar{l}=\{0;3;-4\}$ , $M_0(2;1;1)$. |
| 9. $x^2-6x+9y^2+9=-z^2-4z$, $M_0(3;0;-4)$. |
| 10. $z=-x^2-y^2-\frac{3}{x}-\frac{4}{y}$ . |
| 11. $z=xy(4-x-y)$, $D:\begin{cases}x=1, y=0,\\ x+y=6.\end{cases}$ |

## -13-

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| 1. *a)* $2y^2+x^2=2z$ ; *b)* $x^2+y^2+z^2+4z=0$. |
| 2. $x^2+y^2+(z-7)^2=16$ , $z=6.$ |
| 3. $z=0; z=\sqrt{1-y}; y=x^2$ . |
| 4. $z=\ln\frac{x}{y}$ . |
| 5. $z=\exp(-4x+y^2)$ ; $z=\frac{4x^2+y}{y^2+4x}$ ; $z=\sin^2\frac{4x=1}{y}$ ; $z=(1+4y)^x$ ; $z=\ln\left(4x+\sqrt{1+y^2}\right)$ . |
| 6. $z=\exp(4xy^2+1)$ . |
| 7. $u=xyz$ , $v=x^2+9y^2+6z^2$ , $M_0\left(1;\frac{1}{3};\frac{1}{\sqrt{6}}\right)$. |
| 8. $u=7\ln\left(\frac{1}{13}+x^2\right)-4xyz$ , $S: 7x^2-4y^2+4z^2=7$ , $M_0(1;1;1)$. |
| 9. $x^2z+y^2z=4$ , $M_0(-2;0;1)$ . |
| 10. $z=3\ln x-(x+1)y+4$ . |
| 11. $z=x^2+2xy-y^2-4x$ , $D:\begin{cases}y=x+1, y=0,\\ x=3.\end{cases}$ |

## -14-

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| 1. *a)* $y^2=4-z$ ; *b)* $x^2+y^2+z^2-4x=0$ . |
| 2. $x^2/9-y^2=1$ , $z=5.$ |
| 3. $z=0; z=2x; x+y=3; x=\sqrt{y/2}$ . |
| 4. $z=\ln\left(\frac{y^2}{4}-\frac{x^2}{9}-1\right)$. |
| 5. $z=\exp(-4x+2y^2)$ ; $z=\sin\frac{2x}{y}\cdot\cos\frac{y}{x}$ ; $z=(1+4y)^{2x}$ ; $z=\ln(4x+2\ln y)$; $z=arctg(4x)^y$ . |
| 6. $z=\exp(4xy^2+2)$ . |
| 7. $u=\frac{y^3}{x^2z}$ , $v=\frac{2}{x}+\frac{3}{2y}-\frac{\sqrt{6}}{4z}$ , $M_0\left(\sqrt{\frac{2}{3}};\sqrt{\frac{3}{2}};\frac{1}{2}\right)$ . |
| 8. $u=xy-\frac{x}{y}$ , $\bar{l}=\{5;1;1\}$ , $M_0(-4;3;-1)$ . |
| 9. $x+y+\ln(z^2+y^2)=0$ , $M_0(-1;1;0)$. |
| 10. $z=-x^2-y^2-\frac{4}{x}-\frac{2}{y}$ . |
| 11. $z=x^2+2xy-10$ , $D:\begin{cases}x=1, y=0,\\ x+y=6.\end{cases}$ |

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| 1. *a)* $y^2+4z^2=x^2$ ; *b)* $2x^2+y^2=4$. |
| 2. $y^2+z^2+x^2=16$ , $x^2+y^2=z^2$ . |
| 3. $x=0; y=0; z=y^2; 2x+3y=6.$ |
| 4. $z=\ln(y^2-2x)$ . |
| 5. $z=4xy+x^2-3y$ ; $z=\exp(-4x+3y^2)$; $z=\sin^2\dfrac{4x-1}{3y}$ ; $z=\ln\left(4x+3\sqrt{1+y^2}\right)$ ; $z=(1+4y)^{3x}$ . |
| 6. $z=\exp(4xy^2+3)$ . |
| 7. $u=xy^2z$ , $v=\sqrt{2}x^2-\dfrac{3}{\sqrt{2}}y^2-6\sqrt{2}z^2$ , $M_0\left(1;\dfrac{2}{3};\dfrac{1}{\sqrt{6}}\right)$. |
| 8. $u=arctg\dfrac{y}{x}+xz$ , $S: x^2+y^2-2z=10$ , $M_0(2;2;-1)$. |
| 9. $\dfrac{x^2}{4}+\dfrac{y^2}{9}-\dfrac{z^2}{16}=1$ , $M_0(2;3;4)$. |
| 10. $z=4\ln x-(x+1)y+3$ . |
| 11. $z=x^2+2xy-y^2+2x+2y$, $D:\begin{cases}y=x+2, y=0,\\ x=2.\end{cases}$ |



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| 1. *a)* $z=x^2/5+y^2/4$ ; *b)* $x^2+y^2+z^2+2x=0.$ |
| 2. $x^2/16+y^2/12+z^2/4=1$, $x=2.$ |
| 3. $z=0; z=(x-1)^2; y^2=x.$ |
| 4. $z=\sqrt{x+\sqrt{y+1}}$ . |
| 5. $z=4xy+x^2-4y$ ; $z=\exp(-4x+4y^2)$; $z=(1+4y)^{4x}$; $z=\ln(4x+4\ln y)$; $z=arctg(4x)^{2y}$. |
| 6. $z=\exp(4xy^2+4)$ . |
| 7. $u=\dfrac{x}{yz^2}$ , $v=-\dfrac{\sqrt{6}}{2x}+\dfrac{\sqrt{6}}{2y}-\dfrac{2}{3z}$ , $M_0\left(\dfrac{1}{\sqrt{2}};\dfrac{1}{\sqrt{2}};\dfrac{1}{\sqrt{3}}\right)$ . |
| 8. $u=z^2+2arctg(x-y)$ , $\bar{l}=\{1;2;-2\}$ , $M_0(1;2;-1)$ . |
| 9. $x^2+y^2-y+2x+4z-13=0$ , $M_0(1;2;2)$. |
| 10. $z=x^3+y^3-4xy+4$. |
| 11. $z=y^2-2xy-x^2+4y+1$ , $D:\begin{cases}x+y+1=0,\\ x=0, y=3.\end{cases}$ |

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| 1. *a)* $x^2/16+y^2/4=1$ ; *b)* $x=-(y^2+z^2)$. |
| 2. $x^2+y^2+z^2=4$ , $x^2+y^2=3z$. |
| 3. $x^2+z^2=y^2; x^2+z^2=R^2; y=0.$ |
| 4. $z=\ln(-x-y)$ . |
| 5. $z=\dfrac{5x^2+y}{y^2+5x}$ ; $z=\sin\dfrac{5x}{y}\cdot\cos\dfrac{y}{x}$ ; $z=(1+5y)^x$ ; $z=\ln(5x+\ln y)$; $z=5xy+x^2-y$. |
| 6. $z=\exp(5xy^2+1)$. |
| 7. $u=\dfrac{y^2z^3}{x^2}$ , $v=\dfrac{6}{x}+\dfrac{2}{y}-\dfrac{3\sqrt{3}}{2\sqrt{2}z}$ , $M_0\left(\sqrt{2};\sqrt{2};\dfrac{\sqrt{3}}{2}\right)$. |
| 8. $u=\sqrt{x^2+y^2}-z$ , $S: x^2+y^2=25z$ , $M_0(3;4;1)$ . |
| 9. $z=x+\ln\dfrac{y}{x}$ , $M_0(1;1;1)$. |
| 10. $z=5x^3+y^3-3xy$. |
| 11. $z=x^2+xy-2$ , $D: y=4x^2-4, y=0.$ |



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|---|
| 1. *a)* $x^2/4+y^2=(z-1)^2$ ; *b)* $y=x^2-4z^2$ . |
| 2. $x^2+y^2+z^2=2$ , $y^2+z^2=x^2$ . |
| 3. $x=y^2+z^2; y^2+z^2=y; y^2+z^2=2y; x=0.$ |
| 4. $z=\arcsin 3xy$ . |
| 5. $z=\dfrac{5x^2+2y}{2y^2+5x}$ ; $z=\exp(-5x+2y^2)$ ; $z=\sin^2\dfrac{5x-1}{2y}$ ; $z=\ln\left(5x+2\sqrt{1+y^2}\right)$ ; $z=(1+5y)^{2x}$ . |
| 6. $z=\exp(5xy^2+2)$ . |
| 7. $u=\dfrac{y^2z^3}{x}$ , $v=\dfrac{1}{\sqrt{2}x}-\dfrac{2\sqrt{2}}{y}-\dfrac{3\sqrt{3}}{2z}$ , $M_0\left(\dfrac{1}{2};\dfrac{\sqrt{3}}{2};1\right)$ . |
| 8. $u=\sqrt{xy}+\sqrt{9-z^2}$ , $\bar{l}=\{-2;2;-1\}$ , $M_0(1;1;0)$. |
| 9. $x^2+y^2+z^2=2z$ , $M_0\left(\dfrac{1}{2};\dfrac{\sqrt{3}}{2};1\right)$. |
| 10. $z=x^3+y^3-5xy+2$ . |
| 11. $z=2x^2+2xy-\dfrac{y^2}{2}-4x$ , $D:\begin{cases} y=2x, y=2, \\ x=0. \end{cases}$ |

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|---|
| 1. *a)* $x^2 = y^2/4 + z^2$ ; *b)* $x = 2y^2 + z^2$ . |
| 2. $x^2/9 + y^2/4 + z^2/25 = 1$ , $z = 3.$ |
| 3. $x^2 + y^2 = a^2; z = a + x; z = -x - a$ . |
| 4. $z = \sqrt{\sqrt{y} - x + 2}$ . |
| 5. $z = \dfrac{x^2 + 3y}{3y^2 + x}$ ; $z = \sin\dfrac{x}{3y} \cdot \cos\dfrac{y}{x}$ ; $z = arctg(2x)^{3y}$ ; $z = \ln\left(2x + 6\sqrt{1 + y^2}\right)$ ; $z = (1 + 2y)^{6x}$ . |
| 6. $z = \exp(2xy^2 + 6)$ . |
| 7. $u = \dfrac{y}{xz^2}$ , $v = 6\sqrt{6}x^3 - 6\sqrt{6}y^3 + 2z^3$ , $M_0\left(\dfrac{1}{\sqrt{6}}; \dfrac{1}{\sqrt{6}}; 1\right)$ . |
| 8. $u = x\sqrt{y} - (z + y)\sqrt{x}$ , $S: x^2 - y^2 + z^2 = 4$ , $M_0(1;1;-2)$ . |
| 9. $\dfrac{x^2}{16} - \dfrac{y^2}{18} + \dfrac{z^2}{9} = 0$ , $M_0(4;6;3)$ . |
| 10. $z = 5x^3 + 3y^3 - 3xy$ . |
| 11. $z = x^2 + 2xy + 4x - y^2$ , $D: \begin{cases} x + y + 2 = 0 \\ x = 0, y = 0. \end{cases}$ |



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| 1. *a)* $x^2 = 4z$ ; *b)* $4x^2 + 9y^2 - 8x + 36y + 4 = 0.$ |
| 2. $z = x^2 + y^2$ , $2z = 1 - x^2 - y^2$ . |
| 3. $z = x^2 + y^2; x + z = 2.$ |
| 4. $z = \arcsin\left(1 - x^2 - y^2\right)$ . |
| 5. $z = \ln\left(5x + 4\sqrt{1 + y^2}\right)$ ; $z = \exp\left(-5x + 4y^2\right)$ ; $z = (1 + 5y)^{4x}$ ; $z = \ln(5x + 4\ln y)$ ; $z = \sin(\cos 4x)^{2y}$ . |
| 6. $z = \exp(5xy^2 + 4)$ . |
| 7. $u = \dfrac{yz^2}{x}$ , $v = x^2 - y^2 - 3z^2$ , $M_0\left(\dfrac{1}{\sqrt{2}}; \dfrac{1}{\sqrt{2}}; \dfrac{1}{\sqrt{3}}\right)$ . |
| 8. $u = x^3 + \sqrt{y^2 + z^2}$ , $\bar{l} = \{0;1;-1\}$ , $M_0(1;-3;4)$ . |
| 9. $z = \cos\dfrac{y}{xz}$ , $M_0(-1;\pi;-1)$ . |
| 10. $z = 5x^3 + 4y^3 - 3xy$ . |
| 11. $z = x^2 y$ , $D: y = 1 - x^2, y = 0$ . |

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|---|
| 1. *a*) $(x-2)^2+y^2=z$ ; *b*) $x^2+y^2+z^2=4y$ . |
| 2. $x^2+y^2=4$ , $y-z=0.$ |
| 3. $y^2=4-3x; y^2=x; z=-2; z=2.$ |
| 4. $z=\ln(y-\ln x)$ . |
| 5. $z=5xy+x^2-6y$ ; $z=\exp(-5x+6y^2)$ ; $z=\sin\frac{5x}{6y}\cdot\cos\frac{y}{x}$ ; $z=\ln\left(5x+6\sqrt{1+y}\right)$ ; $z=arctg(5x)^{3y}$ . |
| 6. $z=\exp(5x^2y^2+6)$ . |
| 7. $u=\frac{z^2}{x^2y^2}$ , $v=\frac{3x^2}{\sqrt{2}}-\frac{y}{\sqrt{2}}+\sqrt{2}z^2$ , $M_0\left(\frac{2}{3};2;\sqrt{\frac{2}{3}}\right)$ . |
| 8. $u=\sqrt{xy}-\sqrt{4-z^2}$ , $S: z=x^2-y^2$ , $M_0(1;1;0)$ . |
| 9. $x^2y^2+2y+z^3=16$ , $M_0(1;2;2)$ . |
| 10. $z=-x^2-y^2-\frac{5}{x}-\frac{6}{y}$ . |
| 11. $z=4-2x^2-y^2$ , $D: x^2++y^2\le 1$ . |



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|---|
| 1. *a*) $x^2/3+y^2=2z$ ; *b*) $9y=x^2-z^2$ . |
| 2. $4-z=x^2+y^2$ , $z=2.$ |
| 3. $z=y^2/12; 2x+3y=12; x=0; y=0; z=0.$ |
| 4. $z=\sqrt{\ln x+\ln y}$ . |
| 5. $z=\frac{x^2+6y}{6y^2+x}$ ; $z=\exp(-x+6y^2)$ ; $z=\sin^2\frac{x-1}{6y}$ ; $z=(1+y)^{6x}$ ; $z=\ln(x+6\ln y)$ . |
| 6. $z=\exp(xy^2+6)$ . |
| 7. $u=\frac{x^2}{y^2z^3}$ , $v=\frac{x^3}{\sqrt{2}}-\frac{y^3}{\sqrt{2}}-\frac{8z^3}{\sqrt{3}}$ , $M_0\left(\sqrt{2};\sqrt{2};\frac{\sqrt{3}}{2}\right)$. |
| 8. $u=\sin(x+2y)+\sqrt{xyz}$ , $\bar{l}=\{4;3;0\}$ , $M_0\left(\frac{\pi}{2};\frac{3\pi}{2};3\right)$ . |
| 9. $(8-z^2)y^2-4x^2=0$ , $M_0(1;1;2)$ . |
| 10. $z=-x^2-y^2-\frac{1}{x}-\frac{6}{y}$ . |
| 11. $xy=z$ , $D$ - треугольник с вершинами $O(0;0)$ ; $B(2;0)$ ; $C(0;3)$ . |

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|---|
| 1. *a)* $x^2+y^2=2(z-1)^2$ ; *b)* $4x^2+z^2=4$. |
| 2. $x^2+y^2=4$ , $x-z=0$ . |
| 3. $x^2+y^2=2z; x^2+y^2=x; z=0.$ |
| 4. $z=\ln\dfrac{x^2+y^2}{x-y}$ . |
| 5. $z=5xy+x^2-3y$; $z=(-5x+3y^2)$ ; $z=\sin^2\dfrac{5x-1}{3y}$ ; $z=\ln\left(5x+3\sqrt{1-y}\right)$ ; $z=arctg\sqrt{(5x)^{3y}}$ . |
| 6. $z=\exp(5xy^2+3).$ |
| 7. $u=x^2yz^3$ ; $v=\dfrac{3}{2}x^2+3y^2-2z^2$ , $M_0\left(2;\dfrac{1}{3};\sqrt{\dfrac{3}{2}}\right)$ . |
| 8. $u=\sqrt{(x^2+y^2+z^2)^3}$ , $S: 2x^2-y^2+z^2-7=0$ , $M_0(0;-3;4)$. |
| 9. $x=\sin\dfrac{y}{xz}$ , $M_0(1;\pi;2)$ . |
| 10. $z=-x^2-y^2-\dfrac{2}{x}-\dfrac{6}{y}$ . |
| 11. $z=0.5x^2-xy$ , $D: y=\dfrac{x^2}{3}, y=3$ . |



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|---|
| 1. *a)* $2z=1-x^2-y^2$ ; *b)* $z^2=x^2/16+y^2$ . |
| 2. $x^2+y^2+z^2=16$ , $x^2+y^2=6z$ . |
| 3. $x=6-y^2-z^2; x^2=y^2+z^2; (x\ge 0).$ |
| 4. $z=\arcsin\dfrac{x^2}{y}$ . |
| 5. $z=3xy+x^2-6y$ ; $z=\exp(-3x+6y^2)$; $z=\sin\dfrac{x}{3y}\cdot\cos\dfrac{y}{x}$; $z=\ln\left(3x+6\sqrt{1+y^2}\right)$; $z=arctg(3x)^{3y}$. |
| 6. $z=\exp(3xy^2+6)$. |
| 7. $u=\dfrac{xy^2}{z^3}$ , $v=9\sqrt{2}x^3-\dfrac{y^3}{2\sqrt{2}}-\dfrac{4z^3}{\sqrt{3}}$ , $M_0\left(\dfrac{1}{3};2;\sqrt{\dfrac{3}{2}}\right)$ . |
| 8. $u=x(\ln y-arctgz)$ , $\bar{l}=\{8;4;8\}$ , $M_0(-2;1;-1)$ . |
| 9. $x=y\cdot tg\dfrac{z}{3}$ , $M_0\left(3;3;\dfrac{3\pi}{4}\right)$. |
| 10. $z=x^3+y^3-3xy+6$ . |
| 11. $z=1+xy^2$ , $D:\begin{cases}0\le x\le 1;\\ -1\le y\le 2.\end{cases}$ |

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|---|
| 1. *a)* $x^2+z^2=2y^2$ ; *b)* $2y^2+z^2=1-x$ . |
| 2. $x^2+y^2+z^2=2$, $x^2+y^2=z^2$ . |
| 3. $x=y^2+z^2; y+z=1; x=0; y=0; z=0.$ |
| 4. $z=\sqrt{\ln(2-x-y)}$ . |
| 5. $z=\dfrac{2x^2+3y}{3y^2+2x}$ ; $z=\ln\left(4x+6\sqrt{1+y^3}\right)$ ; $z=\sin\dfrac{2x}{3y}\cdot\cos\dfrac{y}{2x}$ ; $z=(1-4y)^{6x}$ ; $z=\ln(4x-6\ln y)$. |
| 6. $z=\exp(-x^2+3xy)$. |
| 7. $u=\dfrac{1}{xyz}$ , $v=x^2+9y^2+6z^2$ , $M_0\left(1;\dfrac{1}{3};\dfrac{1}{\sqrt{6}}\right)$ . |
| 8. $u=\ln(1+x^2+y^2)-\sqrt{x^2+z^2}$ , $S: x^2-6x+9y^2+z^2=4z+23$ , $M_0(3;0;-4)$ . |
| 9. $y=\ln(x^2+z^2)$ , $M_0(1;0;0)$ . |
| 10. $z=4x^3-6y^3-3xy$. |
| 11. $z=y^2+2xy-x^2-4y$ , $D:\begin{cases}y=x+1,\\x=3, y=0.\end{cases}$ |



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|---|
| 1. *a)* $(x^2+y^2)^2=R^2(x^2-y^2)$ ; *b)* $2y=x^2-z^2$. |
| 2. $x^2+y^2+z^2=49$, $x^2+y^2+z^2-4z-25=0$. |
| 3. $x^2-y^2=az; x^2+y^2=a^2; z=0.$ |
| 4. $z=\sqrt{x-\sqrt{y-1}}$ . |
| 5. $z=3x^2-2xy+2y^2$; $z=\exp(x+2xy)$; $z=\arcsin\sqrt{y^x}$ ; $z=tg^2\dfrac{x-1}{2y}$ ; $z=\ln\left(xy+4\sqrt{x+y}\right)$ . |
| 6. $z=\ln\dfrac{x^2-y^2}{xy}$. |
| 7. $u=\dfrac{x^2-y^2}{z^2}$ , $v=\dfrac{1}{x}-\dfrac{2}{y}+\dfrac{3}{z^2}$ , $M_0(1;1;2)$. |
| 8. $u=x^2y-\sqrt{xy+z^2}$ , $\bar{l}=\{0;2;-2\}$ ; $M_0(1;5;-2)$. |
| 9. $x-xy+z-\exp(-z)+1=0$ , $M_0(1;1;0)$. |
| 10. $z=\dfrac{1}{x}+\dfrac{1}{y}-2xy+1$ . |
| 11. $z=xy-x^2-2\ln x$ , $D:\begin{cases}x=1, x=4,\\-1\le y\le 3.\end{cases}$ |

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|---|
| 1. *a)* $z = xy$ , *b)* $x^2 - 2x + 4y^2 + 4z^2 = 3$. |
| 2. $x^2 + y^2 + z^2 = 10y$ , $x + 2y + 2z - 19 = 0$. |
| 3. $z = x^2 + y^2; z^2 = xy.$ |
| 4. $z = \arcsin(3 - x^2 - y^2)$ . |
| 5. $z = 9x^3 - 2xy + 2y^2$ ; $z = \exp(x^2 + 2xy)$; $z = tg^2 \dfrac{x-4}{2y^2}$; $z = \arcsin\sqrt[3]{y^x}$ ; $z = \ln\ln(x^2 y - x^3)$ . |
| 6. $z = \dfrac{\exp(xy)}{x \cdot \exp y + 1}$ . |
| 7. $u = \dfrac{arctgy}{z(1+x^2)}$ , $v = z^3 + 3x^2 z - 2xy$ , $M_0(1;-1;2)$ . |
| 8. $u = \ln(1+x^2) - xy\sqrt{z}$ , $S: 4x^2 - y^2 + z^2 = 16$ , $M_0(1;-2;4)$ . |
| 9. $x^2 - 2y^2 + z^2 = 1$ , $M_0\left(1; \dfrac{1}{\sqrt{2}}; 1\right)$ . |
| 10. $z = 2\ln y - (x+1)y + 1$ . |
| 11. $z = (x - y^2)\sqrt[3]{(x-1)^2}$ , $D: y^2 = x, x = 2$ . |



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|---|
| 1. *a)* $z^2 = 4 - 2x$ , *b)* $x^2 + y^2 - 2y = 0$. |
| 2. $x^2/4 + y^2/9 + z^2 = 1$, $z^2 - 1 = 0.$ |
| 3. $x^2 + y^2 + z^2 = 10; x^2 + y^2 = 4x.$ |
| 4. $z = \arcsin(3 - x^2 - y^2)$ . |
| 5. $z = \dfrac{2x^2 + 2y}{y^2 + 2x}$ ; $z = \ln 2x + 2\ln y$; $z = arctg(2x)^y$ ; $z = \sin^2 \dfrac{2x-1}{2y}$ ; $z = x^3 + y^3 - 9xy + 27$. |
| 6. $z = \ln \dfrac{x^2 - y^2}{xy}$ . |
| 7. $u = -2\ln(5 - x^2) - 4xyz$ , $v = x^2 + y^2 - z^2 - 4xyz$ , $M_0(1;1;1)$ . |
| 8. $u = \sqrt{(x^2 + y^2 + z^2)^3}$ , $\bar{l} = \{1;-1;1\}$ , $M_0(1;1;1)$ . |
| 9. $x^2 + 2y^2 - 2z^2 = 1$ , $M_0(1;1;1)$ . |
| 10. $z = -x^2 - y^2 - \dfrac{2}{x} - \dfrac{2}{y}$ . |
| 11. $z = \dfrac{xy}{2} - \dfrac{x^2 y}{6} - \dfrac{xy^2}{8}$ , $D: \begin{cases} x = 0, y = 0, \\ \dfrac{x}{3} + \dfrac{y}{4} = 1. \end{cases}$ |

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|---|
| 1. *a)* $z=3+x^2+y^2$ ; *b)* $z^2=9(x^2+y^2)$. |
| 2. $x^2+y^2=z$, $x^2+y^2=1$. |
| 3. $x^2+y^2+z^2=1; x^2+y^2=x$. |
| 4. $z=\dfrac{1}{\sqrt{1-y+x^2}}$ . |
| 5. $z=\dfrac{\sqrt{y-x}}{\sqrt{x+y}}$ ; $z=xy+x^2-y$; $z=\exp(-x+y^2)$; $z=(1+y)^x$ ; $z=arctg\sqrt{x^{y+1}}$ . |
| 6. $z=\ln(5x+9y^2)$. |
| 7. $u=0.25x^2y-\sqrt{x^2+5z^2}$ , $v=\dfrac{1}{\sqrt{xyz}}-\sin(x+y)$ , $M_0\left(\dfrac{\pi}{2};\dfrac{\pi}{2};1\right)$ . |
| 8. $u=\dfrac{x^3}{2}+6y^3+3\sqrt{6}z^3$ , $S: z=\sqrt{x^2+y^2}$ , $M_0(1;2;\sqrt{5})$. |
| 9. $z^3+3xyz+4=0$ , $M_0(1;1;-1)$. |
| 10. $z=x^3+y^3-xy+1$ . |
| 11. $z=3x^2+3xy-y^2+4$ , $D:\begin{cases}x=1, y=-1,\\ x+y=1.\end{cases}$ |



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|---|
| 1. *a)* $x^2+4y^2=4$ ; *b)* $y^2+2z^2=x^2$. |
| 2. $x^2+y^2-z^2=1$ , $x^2+y^2=4$. |
| 3. $x^2/4+y^2/9-z^2/16=1; z=0; z=4$. |
| 4. $z=\ln\dfrac{x-y^2}{7}$ . |
| 5. $z=\dfrac{x^2+3y}{3y^2+x}$ ; $z=arctg\sqrt{(x-1)^{3y}}$; $z=\sin^3\dfrac{x+1}{3y^2}$ ; $z=\ln\left(2x^2-3\sqrt{1-2y^3}\right)$; $z=\ln\sin\dfrac{x}{y}\cdot\cos\dfrac{y^2}{2}$ . |
| 6. $z=\ln tg\dfrac{x}{y}$ . |
| 7. $u=xz^2-\sqrt{x^3y}$ , $v=\dfrac{x^3}{3}-x^2+3z^2-xyz$ , $M_0(1;-1;1)$ . |
| 8. $u=2\sqrt{x+y}+y\cdot arctgz$ , $\bar{l}=\{4;0;-3\}$ , $M_0(3;-2;1)$. |
| 9. $\dfrac{x}{z}=\ln\dfrac{z}{y}+1$ , $M_0(1;1;1)$ . |
| 10. $z=\dfrac{x^3}{3}+2y^2-x+y$ . |
| 11. $z=x^2+2xy-4x+8y$ , $D:\begin{cases}x=0, y=0,\\ x=1, y=2.\end{cases}$ |

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|---|
| 1. *a)* $x^2+z^2=4$ ; *b)* $z=9-y^2$ . |
| 2. $x=6-y^2-z^2$ , $x=3.$ |
| 3. $z^2=2x; z=0; x^2+y^2=x.$ |
| 4. $z=\dfrac{1}{\sqrt{4x^2+9y^2-1}}$ . |
| 5. $z=2xy+x^2-3y$ ; $z=\sin\dfrac{2x+1}{y^2}\cdot\cos\dfrac{y^3}{3x}$ ; $z=arctg\sqrt[4]{(2x+2)^y}$ ; $z=\ln(2x+3y)$ ; $z=\exp(y^2+xy)$ |
| 6. $z=\cos\dfrac{1}{y}-\dfrac{1}{\sqrt{xy}}$ . |
| 7. $u=x\sqrt{y}-yz^2$ , $v=x^2+y^2-z^3+4xz$ , $M_0(2;1;-1)$ . |
| 8. $u=\dfrac{4\sqrt{6}}{x}-\dfrac{\sqrt{6}}{9y}+\dfrac{3}{z}$ , $S: z=x^2+y^2-4$ , $M_0(1;2;1)$ . |
| 9. $3(x^2+y^2+z^2)-2(xy+yz+xz)=35$ , $M_0(3;4;2)$ . |
| 10. $z=\dfrac{x^3}{3}+2y^2-x+y$ . |
| 11. $z=x^2+2xy-4x+8y$ , $D:\begin{cases}0\le x\le 1,\\ 0\le y\le 2.\end{cases}$ |



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|---|
| 1. *a)* $z=9+x^2+y^2$ ; *b)* $z^2=3(x^2+y^2)$ . |
| 2. $x^2+y^2+z^2=16$ , $y^2+z^2=x.$ |
| 3. $z^2=2(x^2+y^2); x^2+y^2+z^2=6.$ |
| 4. $z=\sqrt{(x^2+y^2-1)(2-x^2+y^2)}$ . |
| 5. $z=3xy+x^2-y$ ; $z=\cos\dfrac{y+1}{x-1}\cdot\sin\dfrac{3x}{\sqrt{y}}$ ; $z=\sin^2\sqrt{\dfrac{3x-1}{y}}$ ; $z=\ln\left(3x-x\sqrt{1-y^2}\right)$ ; $z=\dfrac{x^3+\sqrt{y}}{y^3+\sqrt{x}}$ . |
| 6. $z=\sqrt{x^2-y^2}\cdot\exp(x^2y)$ . |
| 7. $u=7\ln\left(x^2+\dfrac{1}{13}\right)-4xyz$ , $v=\dfrac{x-z^2}{3xy}$ , $M_0(1;-1;0)$ . |
| 8. $u=\ln(x^2+y^2)+xyz$ , $\bar{l}=\{1;-1;5\}$ , $M_0(1;-1;2)$ . |
| 9. $2x^2+2y^2+z^2-8xz-z+8=0$ , $M_0(2;0;1)$ . |
| 10. $z=-x^2-y^2-\dfrac{3}{x}-\dfrac{1}{y}$ . |
| 11. $z=3x^3++y^3-3xy$ , $D:\begin{cases}0\le x\le 1,\\ 0\le y\le 4.\end{cases}$ |

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|---|
| 1. *a)* $6y = x^2 - z^2$ ; *b)* $z^2 = 2(x^2 + y^2)$. |
| 2. $x^2 + y^2 = 4z$, $x^2 + y^2 = z^2$. |
| 3. $y^2 + z^2 = 2x; y^2 + z^2 = 2z; x = 0.$ |
| 4. $z = \sqrt{4 - x^2 + y^2}$ . |
| 5. $z = \ln\left(3\sqrt{x} - 2\sqrt{1 - y^2}\right)$; $z = \exp(-3x^2 - y^2)$; $z = \sqrt{(1+3y)^{2x}}$ ; $z = arctg^2(x^2)^y$; $z = 5x^3 - 4x^2 + xy^2 - y^3$ |
| 6. $z = \exp\left(\frac{x}{y}\right) \cdot \ln y$ . |
| 7. $u = arctg\frac{y}{x} + xy$ , $v = xz^2 + \sin\frac{x}{y}$ , $M_0(1;-1;1)$ . |
| 8. $u = \frac{yz^2}{x^2}$ , $S: z = x^2 + y^2 - 16$ , $M_0(2;3;-3)$ . |
| 9. $z + x + y - 1 = 2\ln z$ , $M_0(2;-2;1)$ . |
| 10. $z = x^2 + xy + y^2 - 2x - 3y$ . |
| 11. $z = \sqrt{2 - 2x^2 - 2y^2}$ , $D: x^2 + y^2 \le 1$ . |



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|---|
| 1. *a)* $x = y^2 + z^2/9$ ; *b)* $x^2 + y^2 + z^2 - 2x + 2x + 1 = 0.$ |
| 2. $z^2 = xy$, $z = 3.$ |
| 3. $z = x^2 + y^2; y = x^2; y = 1; z = 0.$ |
| 4. $u = \ln(-1 - x^2 - y^2 + z^2)$. |
| 5. $z = \frac{3x^2 + 3y}{2y^2 + 2x}$ ; $z = \sin\sqrt{\frac{x}{y}} \cdot \cos\frac{y^2}{x^2}$ ; $z = tg^2\frac{3x-1}{y}$ ; $z = \ln\left(3\sqrt{x} - 3\ln(y+1)\right)$ ; $z = \sqrt[x]{y+2}$ . |
| 6. $z = \frac{x^2}{y^2} + \sqrt{x+y} + \frac{1}{\cos(x+y)}$ . |
| 7. $u = \ln(1+x^2) - xy\sqrt{z}$ , $v = x^2 - 3y^2 + \frac{z^2}{x-1}$ , $M_0(0;-1;1)$ . |
| 8. $u = \ln\left(x + \sqrt{y^2 + z^2}\right)$ , $\bar{l} = \{-2;-1;1\}$ , $M_0(1;-3;4)$ . |
| 9. $z^3 - 2xz - 2y = 0$ , $M_0(3;-2;2)$ . |
| 10. $z = 3\ln x - (x-1)y + 3$ . |
| 11. $z = x^2 - 2y^2 + 4x - y$ , $D: x^2 + 2y^2 \le 9$ . |

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|---|
| 1. *a)* $z=16-x^2$ ; *b)* $x^2+y^2-4x=0$ . |
| 2. $x^2=y^2+4z^2$ , $z^2=0.5xy$. |
| 3. $z=4-y^2; y=x^2/2; z=0.$ |
| 4. $z=\arcsin\dfrac{x^2}{y}+\arccos(1+y)$ . |
| 5. $z=x^2-2xy+y^3-xy^2+x^2y$ ; $z=\exp(\arcsin xy)$ ; $z=ctg\sqrt{\dfrac{2x-1}{2y}}$ ; $z=\sin\sqrt{\dfrac{x}{y}}\cdot\cos\dfrac{y+1}{x-1}$ ; $z=\ln\left(3\sqrt{x+1}-3\ln y^2\right)$; |
| 6. $z=\arcsin y\sqrt{x}$ . |
| 7. $u=\sqrt{x^2+y^2}-z$ , $v=\dfrac{3}{x^2}-\dfrac{z^3}{3}+\dfrac{xy}{z}$ , $M_0(1;0;-1)$ . |
| 8. $u=\dfrac{z^3}{xy^2}$ , $S: z=\sqrt{4-x^2-y^2}$ , $M_0(1;1;\sqrt{2})$ . |
| 9. $x^3+z^3-6xz=y^3$ , $M_0(2;2;0)$. |
| 10. $z=x^3+y^3-xy+4$ . |
| 11. $z=x^3+xy^2-3xy+x-2y$ , $D: x^2+y^2\le 4$ . |



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|---|
| 1. *a)* $x^2-y^2=8$ ; *b)* $x^2+y^2+z^2-2y=0$ . |
| 2. $x^2-y^2=4$, $z=4.$ |
| 3. $(x-1)^2+y^2=z; 2x+z=2.$ |
| 4. $u=\ln(x+y+z)$. |
| 5. $z=\dfrac{x^3-4y}{4y^2+x}$ ; $z=\ln\left(2x^2-4\sqrt[3]{1-y^2}\right)$; $z=\exp(-x+3y^3)$; $z=arctg\sqrt[2y]{2x}$ ; $z=\sin\dfrac{x}{2y}\cdot\cos\sqrt{\dfrac{y}{x}}$ . |
| 6. $z=\left(x^2+y^2\right)^{x^2-y^2}$. |
| 7. $u=x\sqrt{y}-(z+y)\sqrt{x}$ , $v=x^2+2y^2+3z^2+xy-6z$ , $M_0(1;1;1)$ . |
| 8. $u=xy^2z$ , $\bar{l}=\left\{\dfrac{1}{2};-\dfrac{1}{2};\dfrac{3}{2}\right\}$ , $M_0(1;1;1)$ . |
| 9. $x^2+y^2+z^2=42$ , $M_0(1;4;5)$ . |
| 10. $z=x^2+xy+y^2-3x+6y$ . |
| 11. $z=\sqrt{3-x^2-2y^2}$ , $D:\begin{cases}x=0, y=0,\\ x+y=1.\end{cases}$ |

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|---|
| 1. *a)* $x^2+y^2++z^2+2z=0$ ; *b)* $x^2-2y^2=z$. |
| 2. $x^2/2+y^2/4=z^2$ , $y=2x.$ |
| 3. $z=x^2+y^2; z=2x^2+2y^2; y=x^2; y=x.$ |
| 4. $z=\arccos\frac{x}{y}$ . |
| 5. $z=\frac{x^3-4y}{4y^2-x}$; $z=\sin^2\frac{3x^3}{4y^2-1}$; $z=arctg(3x-1)^{2y}$; $z=\ln\left(3\sqrt{x}-4\ln(y+1)\right)$; $z=\sqrt{\sin\frac{x}{2y}\cdot\cos\frac{4y}{x+1}}$ |
| 6. $z=x\cdot\sin y+x^2$ . |
| 7. $u=\sqrt{xy}-\sqrt{4-z^2}$ , $v=6\ln xy-\frac{2}{y^2}+\frac{x^2}{z^3}$ , $M_0(1;1;-2)$ . |
| 8. $u=\frac{3}{x}+\frac{4}{y}-\frac{1}{\sqrt{6}z}$ , $S: 8z=x^2+y^2$ , $M_0(-2;-2;1)$. |
| 9. $\sin(x+z)+\cos(y-z)=1$ , $M_0\left(\frac{\pi}{4};\frac{\pi}{4};-\frac{\pi}{12}\right)$ . |
| 10. $z=x^3+y^3-3xy+4x$ . |
| 11. $z=y^2+2xy-3x^2+x$ , $D:\begin{cases}x=0, y=0,\\ x+y=2.\end{cases}$ |



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|---|
| 1. *a)* $x^2+4y^2=8$ ; *b)* $x^2+4y^2=2z-1$. |
| 2. $x^2+y^2+z^2=4x$ , $y=z.$ |
| 3. $z=x^2+y^2; z=x^2+2y^2; y=x; y=2x; x=1.$ |
| 4. $z=\sqrt{(x^2-1)(y^2-1)}$ . |
| 5. $z=4xy+x^2-y$; $z=arctg\sqrt[y]{4x}$ ; $z=\ln(4x+\ln y)^3$; $z=\sin^2\frac{x}{4y}\cdot\cos\frac{y+1}{x-1}$; $z=\exp(-2x+\ln y)$ . |
| 6. $z=\arcsin\frac{x}{y}-\ln y$. |
| 7. $u=\left(x^2+y^2+z^2\right)^{3/2}$ , $v=x^2-y^2-3xyz+z^2$ , $M_0(1;-1;1)$ . |
| 8. $u=\frac{x}{yz^2}$ , $\bar{l}=\{1;1;-1\}$ , $M_0(3;1;-2)$ . |
| 9. $x^2-y^2+2z^2-3xyz+y-z+2=0$ , $M_0(2;1;2)$ . |
| 10. $z=x^3-y^3+y^2+12xy$ . |
| 11. $z=x^2-3y^2-x-18y-4$ , $D:\begin{cases}0\le x\le 4,\\ 0\le y\le 9.\end{cases}$ |

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|---|
| 1. *a)* $y^2+z^2-2z=0$ ; *b)* $x^2/9+y^2+z^2=1.$ |
| 2. $2x^2+y^2+4z^2=2y$ , $2x=z.$ |
| 3. $z=0; z=4-x^2; x^2+y^2=4.$ |
| 4. $u=\sqrt{(x^2-4)(y^2-1)z}$ . |
| 5. $z=\dfrac{x^2-y^2}{x^2+y^2}$ ; $z=4xy-x^2+2y$; $z=\cos^2\sqrt{\dfrac{x-4}{2y^3}}$ ; $z=\ln^2\left(4x-2\sqrt{1-4y^2}\right)$ ; $z=\exp\dfrac{2x}{x^2+y^2}$ . |
| 6. $z-\ln\sqrt{x^2+y^2}+\dfrac{1}{y}$ . |
| 7. $u=\ln(1+x^2+y^2)-\sqrt{x^2+z^2}$ , $v=xyz$ , $M_0(0;1;2)$ . |
| 8. $u=\dfrac{z}{x^3y^2}$ , $S: z=4-2x^2+3y^2$ , $M_0(2;1;-1)$. |
| 9. $2-x-xy+yz-\ln(x+z)=0$ , $M_0(0;-2;1)$ . |
| 10. $z=x^2+xy+y^2+\dfrac{1}{x}+\dfrac{1}{y}$ . |
| 11. $u=x+y+z$ , $D:\begin{cases}x^2+z^2=z,\\ z=1.\end{cases}$ |



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|---|
| 1. *a)* $x^2-4x+y^2=0$ ; *b)* $x^2+y^2/4+z^2=1$ . |
| 2. $x^2+y^2-4z^2=-4$ , $y=2x.$ |
| 3. $x^2+y^2+z^2=4; x^2+y^2=3z.$ |
| 4. $u=\sqrt{\dfrac{z}{x^2+y^2-1}}$ . |
| 5. $z=\dfrac{x^2-3y}{y^2+4x}$; $z=tg\dfrac{4x}{y}\cdot ctg\dfrac{y}{x}$ ; $z=\arcsin\sqrt{(x+1)^y}$ ; $z=\ln(x^2-9\ln^2 y)$; $z=\exp\dfrac{2x-3y}{x^2+y^2}$ . |
| 6. $z=arctg\dfrac{\exp y}{\sqrt{xy}}$ . |
| 7. $u=(x^2+y^2+z^2)^{3/2}$ , $v=x^2-xy+\dfrac{y}{z}+y^2$ , $M_0(1;-1;2)$ . |
| 8. $u=\dfrac{2}{x}+\dfrac{3}{2y}-\dfrac{\sqrt{6}}{4z}$ , $\bar{l}=\{-1;0;2\}$ , $M_0(1;-1;1)$ . |
| 9. $\ln(z+2x)+y+z=0$ , $M\ (-0.5;-1;1)$. |
| 10. $z=4x^3+3y^3-3xy$. |
| 11. $z=4x+2y+4x^2+y^2+6$ , $D:\begin{cases}x=0, y=a,\\ x+y+2=0.\end{cases}$ |

1. *a)* $y^2-2z^2=x$ ; *b)* $x^3+y^2=(z+1)^2$.

2. $2z-1=x^2$ , $y=z.$

3. $x^2+y^2+z^2=R^2; x^2+y^2=R(R-2z); (z\ge 0).$

4. $z=\arccos\dfrac{y}{x-4}$ .

5. $z=\dfrac{x-\sqrt{y}}{x+\sqrt{y}}$; $z=\sin\dfrac{x}{y^2}\cdot\cos\dfrac{y+1}{x}$; $z=\arcsin\dfrac{4x-1}{4y}$; $z=\ln\sqrt{\dfrac{(x-1)^2+y^2}{(x+1)^2+y^2}}$; $z=x^3+2xy^2-4y^3+x+2y-1$

6. $z=y^2+\sqrt{xy-x^2+5}$ .

7. $u=y^2+\sqrt{xz}$ , $v=x^{y\cdot z}$ , $M_0(1;-1;2)$ .

8. $u=\dfrac{x^3}{2}+6y^2+3\sqrt{6}z^3$ , $S: z--3-5x^2-6y^2$ , $M_0(0;-1;-9)$ .

9. $yz^5+x^3z-y^3=0$ , $M_0(0;1;1)$ .

10. $z=2x^3+xy^2+5x^2+y^2$ .

11. $z=x^2+3y^2-x+18y-4$ , $D:\begin{cases}0\le x\le 4,\\ 0\le y\le 4.\end{cases}$



1. *a)* $x^2=2z$; *b)* $x^2+y^2+z^2-3x+5y-4z=0$.

2. $(x-1)^2+y^2=z$, $2x+z=2.$

3. $x^2+y^2+z^2=4z-3; z=4(x^2+y^2).$

4. $z=\sqrt{\dfrac{x^2+y^2+x}{2x+x^2-y^2}}$ .

5. $z=(x\cdot\cos y-y\cdot\sin y)\cdot\exp x$; $z=\exp(-5x+y^2)$; $z=arctg\sqrt[y]{5x}$; $z=\arcsin^2\dfrac{x+1}{3y}$;

$z=\ln\left(5x^2-4(1+y^2)^3\right)$

6. $z=\dfrac{1}{\sin x}+arctg\dfrac{x+1}{y}$ .

7. $u=x^2y-\sqrt{xy+z^2}$ , $v=4x^2-\dfrac{z}{y}+\dfrac{x}{y^2}$ , $M_0(0;1;-1)$ .

8. $u=x^2+9y^2+6z^2$ , $\bar{l}=\{1;-1;0\}$ , $M_0(-1;0;2)$ .

9. $y-xz+\exp z-2=0$ , $M_0(2;1;0)$ .

10. $z=-x^2-y^2-\dfrac{5}{x}-\dfrac{1}{y}$ .

11. $z=xy-x^2y-xy^2+5x+y-1$ , $D:\begin{cases}x=0, y=0,\\ x+y=1.\end{cases}$

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| 1. *a)* $x^2+y^2=(z-2)^2$ ; *b)* $y^2/4+x^2+z^2/16=1$ . |
| 2. $x^2+4y^2=1$ , $x=2y.$ |
| 3. $x^2+y^2+z^2=1; x^2+y^2+z^2=10; z^2=x^2+y^2; x\ge 0; y\ge 0; z\ge 0.$ |
| 4. $z=\sqrt{\cos(x^2-y^2)}$ . |
| 5. $z=5xy+x^2-2y$ ; $z=\sin\frac{x}{y}\cdot tg\frac{2y}{x}$ ; $z=\arccos(x)^y$ ; $z=\ln(5x^3-2\ln y)^2$ ; $z=x+y+\sqrt{x^2+y^2}$ . |
| 6. $z=x\sqrt{y^2-x^2}$ . |
| 7. $u=y\ln(1+x^2)-arctgz$ , $v=\sqrt{x^2-y^2+z^2}$ , $M_0(1;-1;0)$ . |
| 8. $u=\frac{x^2}{yz^2}$ , $S: z=x^2+4x-y^2+2$ , $M_0(-1;1;-2)$ . |
| 9. $\frac{y-1}{z-1}=\ln\frac{z}{x}+x-y$ , $M_0(1;1;1)$ . |
| 10. $z=2x^2+6xy+5y^2-x+4y-5$ . |
| 11. $z=x^2-xy+y^2$ , $D:\begin{cases}x=0, y=0,\\ x+y=4.\end{cases}$ |



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|---|
| 1. *a)* $x^2+y^2-4y+z^2-2z+1=0$ ; *b)* $y=z^2/2$ . |
| 2. $z=x^2+y^2$ , $y=x.$ |
| 3. $y^2=x; 2x+z=2; x+z=1; y=0; (y>0).$ |
| 4. $u=\arccos\frac{z}{\sqrt{x^2-y^2}}$ . |
| 5. $z=2xy+x^2-6y$ ; $z=\sqrt{\ln xy+1}$ ; $z=\sin^2\frac{2x^2}{y-1}$ ; $z=\ln^2(\sqrt{x}-6\ln^2 y)$ ; $z=\exp(-2\sqrt{x}+\sqrt{y})$ . |
| 6. $z=x\cdot arctg\frac{y}{x}$ . |
| 7. $u=x(\ln y-arctgz)$ , $v=\exp(xyz)$ , $M_0(1;1;0)$ . |
| 8. $u=\frac{3x^2}{\sqrt{2}}-\frac{y^3}{\sqrt{2}}+\sqrt{2}z^2$ , $\bar{l}=\{0;1;-1\}$ , $M_0(-1;0;2)$ . |
| 9. $2x^2+2y^2+z^2-8yz-z+8=0$ , $M_0(0;2;1)$ . |
| 10. $z=6x^3y^2-x^4y^2-x^3y^3$ . |
| 11. $z=2xy-3x^2-3y^2+4(x+y+1)$ , $D:\begin{cases}0\le x\le 3,\\ 0\le y\le 2.\end{cases}$ |

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|---|
| 1. *a)* $x^2/4+y^2=1$ ; *b)* $x^2+y^2+z^2-2y=0.$ |
| 2. $x^2+y^2=4$ , $z=4-x^2$. |
| 3. $z^2+x^2+0.25y^2;4z=x^2+0.25y^2.$ |
| 4. $u=\arcsin\dfrac{x}{\sqrt{y^2+z^2}}$ . |
| 5. $z=\dfrac{x^3-4y^3}{2x-y^2}$; $z=5xy^2+x^2-y$; $z=ctg^2\dfrac{x-1}{y+1}$; $z=\dfrac{xy}{x^2-y^2}$; $z=\exp\dfrac{1}{x^2+y^2}$ . |
| 6. $z=\dfrac{y}{x}\sqrt{\ln x}$ . |
| 7. $u=\ln(x^2-3)+xy^2z$ , $v=z^2-3x^2+4y^2$ , $M_0(2;1;-1)$. |
| 8. $u=3\sqrt{2}x^2-\dfrac{y^2}{\sqrt{2}}-3\sqrt{2}z^2$ , $S: z=\sqrt{8-x^2-y^2}-1$ , $M_0(2;2;-1)$ . |
| 9. $z^3-2yz-2x=0$ , $M\ (-2;3;2)$ . |
| 10. $z=x^2+2xy-2y^2+y$. |
| 11. $z=x^3+y^3-9xy+27$ , $D$: треугольник с вершинами в точках $A(0;0), B(1;0), C(0;1).$ |



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|---|
| 1. *a)* $y=9-z^2$ ; *b)* $x^2+y^2+z^2=3z.$ |
| 2. $x^2+y^2+z^2=4$ , $y^2+z^2=2x.$ |
| 3. $2z=x^2+y^2;x^2+y^2-z^2=1;z=0.$ |
| 4. $u=\ln z-\ln(x+y)$ . |
| 5. $z=\dfrac{5x^2-y^2}{4x-y}$; $z=(1+5y)^{\frac{1}{x}}$; $z=2\ln\sqrt{5x}-\ln\ln(y+1)$; $z=tg\sqrt{\dfrac{x+1}{y}}$; $z=\exp(5x^2y-4)$. |
| 6. $z=\sqrt{xy}\cdot\ln\dfrac{y}{x}$ . |
| 7. $u=\sin(x+2y)+\sqrt{xyz}$ , $v=\dfrac{y-z}{a^2+1}\exp(ax)$ , $M_0(0;\pi;1)$ . |
| 8. $u=\dfrac{1}{xy^2z}$ , $\bar{l}=\{-2;1;-1\}$ , $M_0(1;2;-1)$ . |
| 9. $y^3+z^3-6yz-x^3=0$ , $M_0(2;2;0)$. |
| 10. $z=x^3+y^3-5xy+6x-5y+1$ . |
| 11. $z=xy^2(4-x-y)$ , $D:\begin{cases}x=0, y=0,\\ x+y=2.\end{cases}$ |

1. *a)* $2y^2 = x^2 + z^2$ ; *b)* $x^2 + y^2 + z^2 - 9z = 0.$

2. $x^2 + y^2 + z^2 = 4z - 3$ , $z = 4(x^2 + y^2).$

3. $x^2 + y^2 = 4; x^2 + y^2 - z^2 = -4.$

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

5. $z = xy + x^2 - 6y$ ; $z = \arccos\sqrt{xy^3}$ ; $z = \exp\left(\frac{x}{y^2} - 6\right)$ ; $z = tg\frac{x}{6y} \cdot arctg\frac{y}{x}$ ; $z = \ln\left(\sqrt{x-y} - \sin\sqrt{xy}\right)$

6. $z = x^y \cdot (xy)^{-1}$ .

7. $u = x^2y^2z - \ln(z-1)$ , $v = \frac{1}{x-y} + \frac{1}{x-z} + \frac{1}{y-z}$ , $M_0(1;2;3)$ .

8. $u = \frac{z^2}{xy^2}$ , $S: x^2 + 2y^2 - z^2 = 4$ , $M_0(-1;\sqrt{2};1)$ .

9. $\sin(y+z) + \cos(x-z) = 1$ , $M_0\left(\frac{\pi}{4}; \frac{\pi}{4}; -\frac{\pi}{12}\right)$ .

10. $z = x^4 + y^4 + 2x^2y^2 - 8x + 8y$ .

11. $z = x^3 + 6y^3 - 3xy$ , $D: \begin{cases} -1 \le x \le 1, \\ - \le y \le 1. \end{cases}$



1. *a)* $z^2 + 4z - 2x + 6 = 0$ ; *b)* $4y = x^2 - z^2$ .

2. $x^2 + y^2 + z^2 = 16$, $z^2 = x^2 + y^2$.

3. $y^2 + z^2 = 3x; x^2 + y^2 + z^2 = 4.$

4. $z = \ln(x + 2y)$.

5. $z = \ln\frac{x^2 + y^2}{x - y}$ ; $z = xy^2 - 3x^3 + 2x$; $z = \exp(xy^2 - 3)$; $z = \cos\frac{5x}{y} \cdot \arccos\frac{y}{x}$; $z = \frac{x^2 + 3y}{y + 3x}$ .

6. $z = \exp(y) \cdot \sin\frac{1}{x}$ .

7. $u = x^3 + \sqrt{z^2 + y^2}$ , $v = \ln(x^2 + y^2 + z^2)$ , $M_0(1;1;1)$ .

8. $u = \frac{1}{xyz}$ , $\bar{l} = \{-1;3;-0.5\}$ , $M_0(-1;2;3/2)$ .

9. $y^2 - x^2 + 2z^2 - 3xyz + x - z + 2 = 0$ , $M_0(1;2;2)$ .

10. $z = 2\ln x - (x+1)y + 6$ .

11. $z = 2x^2 - y^2 + 1$ , $D: y = x^2, y = 4.$

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|---|
| 1. *a)* $z = y^2 + 1$ ; *b)* $x^2 - 8x + y^2 + z^2 = 0$ . |
| 2. $z^2 = x^2 + 0.25y^2$ , $4z = x^2 + 0.25y^2$ . |
| 3. $x^2 + y^2 + z^2 = 1; x^2 + z^2 = x; y = 0.$ |
| 4. $z = y + \sqrt{x}$ . |
| 5. $z = \dfrac{x^2 + 2y^2 + 1}{x + y}$; $z = \ln(3\sqrt{xy}) - 6\ln\ln y$; $z = tg^3 \dfrac{x}{y}$ ; $z = (1 + 2y)^{\frac{1}{2x}}$ ; $z = \exp(xy^2 - 4)$ . |
| 6. $z = arctg(x^2 - y^2) + \dfrac{1}{\sqrt{xy}}$ . |
| 7. $u = \dfrac{\sqrt{x}}{y} - \dfrac{yz}{x + \sqrt{y}}$ , $v = 2x^2 - xz^2 + 2xy^2$ , $M_0(1;2;-1)$ . |
| 8. $u = \dfrac{2}{x} + \dfrac{3}{2y} - \dfrac{\sqrt{6}}{4z}$ , $S: z^2 = xy$, $M_0(1;1;-1)$ . |
| 9. $2 - y + xy - \ln(y + z) = 0$ , $M_0(-2;0;1)$ . |
| 10. $z = 3\ln x - (x + y)y + 6$ . |
| 11. $z = -x^2 - y^2 - \dfrac{3}{x} - \dfrac{6}{y}$ , $D: \begin{cases} 1 \le x \le 2, \\ 2 \le y \le 4. \end{cases}$ |



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|---|
| 1. *a)* $y^2 = -6z$ ; *b)* $x^2 + y^2 + z^2 - x - y + z = 0$. |
| 2. $z = x^2 + y^2$ , $x + z = 2.$ |
| 3. $x^2 + y^2 - z^2 = 1; x^2 + y^2 + z^2 = 3.$ |
| 4. $u = \ln(x^2 yz)$ . |
| 5. $z = 4xy + x^2 - 6$ ; $z = \exp(6y^2 - 4xy)$; $z = \arcsin(5x)^{\frac{3y}{2}}$ ; $z = \sqrt{\ln(2 - x - y)}$; $z = \sin^2 \dfrac{x}{y} + \cos^2 \dfrac{y}{x}$. |
| 6. $z = \exp\left(\dfrac{y}{x}\right) \cdot tg \dfrac{1}{x}$ . |
| 7. $u = 2\sqrt{x + y} + y \cdot arctgz$ , $v = x^3 - 9y^2 + 5z^2$ , $M_0(1;1;0)$ . |
| 8. $u = x^2 + 9y^2 + 6z^2$ , $\bar{l} = \{0;-1;2\}$ , $M_0(-1;2;-2)$ . |
| 9. $x^3 + 2y^3 + z^3 - 3xyz - 2y - 9 = 0$ , $M_0(1;0;2)$. |
| 10. $z = x^3 + y^3 - 4xy + 6$ . |
| 11. $z = x^2 - y^2 - 2xy + x - y$ , $D: \begin{cases} y = x + 1, \\ y = 0, y = 4. \end{cases}$ |