Lineárne a kvázilineárne PDR prvého rádu

Nájdite všeobecné riešenie nasledovných rovníc (v príkladoch 16-18 je hľadaná funkcia $u = u(x, y, z)$, inde $z = z(x, y)$):

1. $y\frac{\partial z}{\partial x} + x\frac{\partial z}{\partial y} = x - y$

2. $e^x\frac{\partial z}{\partial x} + y^2\frac{\partial z}{\partial y} = ye^x$

3. $2x\frac{\partial z}{\partial x} + (y - x)\frac{\partial z}{\partial y} - x^2 = 0$

4. $xy\frac{\partial z}{\partial x} - x^2\frac{\partial z}{\partial y} = yz$

5. $x\frac{\partial z}{\partial x} + 2y\frac{\partial z}{\partial y} = x^2y + z$

6. $(x^2 + y^2)\frac{\partial z}{\partial x} + 2xy\frac{\partial z}{\partial y} + z^2 = 0$

7. $2y^4\frac{\partial z}{\partial x} - xy\frac{\partial z}{\partial y} = x\sqrt{z^2 + 1}$

8. $x^2z\frac{\partial z}{\partial x} + y^2z\frac{\partial z}{\partial y} = x + y$

9. $yz\frac{\partial z}{\partial x} - xz\frac{\partial z}{\partial y} = e^z$

10. $(z - y)^2\frac{\partial z}{\partial x} + xz\frac{\partial z}{\partial y} = xy$

11. $xy\frac{\partial z}{\partial x} + (x - 2z)\frac{\partial z}{\partial y} = yz$

12. $y\frac{\partial z}{\partial x} + z\frac{\partial z}{\partial y} = \frac{y}{x}$

13. $\sin^2 x\frac{\partial z}{\partial x} + \text{tg}z\frac{\partial z}{\partial y} = \cos^2 z$

14. $(x + z)\frac{\partial z}{\partial x} + (y + z)\frac{\partial z}{\partial y} = x + y$

15. $(xz + y)\frac{\partial z}{\partial x} + (x + yz)\frac{\partial z}{\partial y} = 1 - z^2$

16. $(y + z)\frac{\partial u}{\partial x} + (z + x)\frac{\partial u}{\partial y} + (x + y)\frac{\partial u}{\partial z} = u$

17. $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + (z + u)\frac{\partial u}{\partial z} = xy$

18. $(u - x)\frac{\partial u}{\partial x} + (u - y)\frac{\partial u}{\partial y} - z\frac{\partial u}{\partial z} = x + y$

19. $y^2\frac{\partial z}{\partial x} + xy\frac{\partial z}{\partial y} = x$

20. $x\frac{\partial z}{\partial x} - 2y\frac{\partial z}{\partial y} = x^2 + y^2$