

## Differential Equations. Week 14

Find general solution for a given equation.

1. (Filippov 1167)  $y \frac{\partial z}{\partial x} - x \frac{\partial z}{\partial y} = 0$
2. (Filippov 1169)  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = 0$
3. (Filippov 1171)  $y \frac{\partial z}{\partial x} + x \frac{\partial z}{\partial y} = x - y$
4. (Filippov 1179)  $yz \frac{\partial z}{\partial x} - xz \frac{\partial z}{\partial y} = e^z$

Solve provided initial values problem.

5. (Filippov 1189)  $x \frac{\partial z}{\partial x} - y \frac{\partial z}{\partial y} = 0$ ;  $z = 2x$  as  $y = 1$ .
6. (Filippov 1191)  $2\sqrt{x} \frac{\partial z}{\partial x} - y \frac{\partial z}{\partial y} = 0$ ;  $z = y^2$  as  $x = 1$ .
7. (Filippov 1192)  $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + 2 \frac{\partial u}{\partial z} = 0$ ,  $u = yz$  as  $x = 1$ .

Find a surface that is a solution of the given differential equation with initial conditions.

8. (Filippov 1195)  $x \frac{\partial z}{\partial x} - 2y \frac{\partial z}{\partial y} = x^2 + y^2$ ,  $y = 1$ ,  $z = x^2$ .
9. (Filippov 1197)  $\tan x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y} = z$ ,  $y = x$ ,  $z = x^3$ .
10. (Filippov 1199)  $x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y} = z - x^2 - y^2$ ,  $y = -2$ ,  $z = x - x^2$ .

**Homework:** Filippov 1211, 1215.