

Non-Homogeneous linear partial differential equation

1. $(D_x - 3 D_y - 2)^2 z = 2e^{2x} \tan(y + 3x)$

Ans: $z = e^{2x} [f_1(y + 3x) + x f_2(y + 3x)] + x^2 e^{2x} \tan(y + 3x)$

2. $(D_x^2 + D_x D_y - 6 D_y^2)z = \cos(2x + y)$

Ans: $z = \phi_1(y - 3x) + \phi_2(y + 2x) + \frac{x}{5} \sin(2x + y) + \frac{1}{25} \cos(2x + y)$

3. $z_{xx} - z_{xy} - 2 z_{yy} = (y - 1) e^x$

Ans: $z = f_1(y - x) + f_2(y + 2x) + y e^x$

4. $(D_x^2 - D_y^2)z = x - y$

Ans: $z = f_1(x + y) + f_2(x - y) + \frac{1}{4} x (x - y)^2$

5. $(D_x^2 - D_x D_y)z = \cos x \cos 2y$

Ans: $z = \phi_1(y) + \phi_2(y + x) + \frac{1}{2} \cos(x + 2y) - \frac{1}{6} \cos(x - 2y)$