

Exercise 3

1. Solve the following Bessel equations.

(a) $x^2y'' + xy' + (x^2 - 5)y = 0$.

(b) $r^2\phi'' + r\phi' + (r^2 - 7)\phi = 0$.

2. Solve the following equation, by using the given transformations,

(a) $xy'' + y' + \frac{1}{4}y = 0$, $z = \sqrt{x}$.

(b) $y'' + (e^{-2x} - \frac{1}{9})y = 0$, $z = e^{-x}$.

(c) $x^2y'' + xy' + (\lambda^2x^2 - \nu^2)y = 0$, $z = \lambda x$.

(d) $xy'' - 5y' + xy = 0$, $y = x^3u$.