

Beginning Differential Equations Homework*

1. Verify that the function $y(x) = e^{-3x}$ is a solution to the DE $y'' + 2y' - 3y = 0$
2. Verify that the function $y(x) = \frac{\ln x}{x^2}$ is a solution to the DE $x^2y'' + 5xy' = -4y$
3. Determine for what value(s) of r the function $y = e^{rx}$ is a solution to the DE $y' + 2y = 0$
4. For what value(s) of r is the function $y = x^r$ ($x > 0$) a solution to the DE $x^2y'' + 4xy' + 2y = 0$?
5. (a) Show that the functions $y = -\frac{1}{2} + Ce^{x^2}$ are solutions to the DE $y' - 2xy = x$
(b) Find a solution to the IVP $y' - 2xy = x$, $y(0) = 1$

* Most of these problems were adapted from Boyce and DiPrima's Elementary Differential Equations and Boundary Value Problems