Practice Quiz 8 Math 2280, Ordinary Differential Equations, Fall 2023

Name: A#:

Problem 1. Chapter 15 Ex. 15.2.g An initial value problem involving a second-order homogeneous linear differential equation with a pair of functions, $y_1(x)$ and $y_2(x)$. Verify the pair of functions forms a fundamental set of solutions to the given differential equation. Then find a linear combination of the functions that satisfies the initial value problem.

$$x^2\ y'' - x\ y' + y = 0,$$

with $y(1) = 5$ and $y'(1) = 3$ and $y_1(x) = x$ and $y_2(x) = x\ln(x)$.

Solution:

Problem 2. Chapter 16.2 (10 points) State the linear differential operator, L, corresponding to the left hand side of

a.

$$\frac{d^2y}{dx^2} + 5\,\frac{dy}{dx} + 6\,y = 0$$

b. Using this L compute each of the following.

i. $L[\sin(x)]$ **ii.** $L[e^{4x}]$ **iii.** $L[e^{-3x}]$ **iv.** $L[x^2]$

c. Based on the values of obtianed in part b., give a possible solution of the differential equation in part a.

Solution: