JBNU ISES

Differential Equation I

2021 Spring Exam #2

* When filling out the answer sheet, use only the front side. The answer sheet used on the back cannot be scored.

1. Based on this given equation

$$y^{(n)} + p_{n-1}(x)\,y^{(n-1)} + ... + p_0(x)y = 0$$

   a. Explain the basis.(2pt)
   b. Explain the linear independence. (2pt)
   c. Explain the Wronskian matrix. (2pt)

2. Describe the superposition principle. (2pt)

3. Describe the proper node, saddle point, and center(based on the examples shown in the textbook). (6pt)

4. Solve the following differential equation.(10pt)

$$y'' - 5y' + 4y = 10e^{-3x}$$

5. Solve the following linear system differential equation

   a) using method of undetermined coefficient (10pt)
   b) using the method of variation of parameter. (6pt)

$$\dot{x} = \begin{bmatrix} -3 & 1 \\ 1 & -3 \end{bmatrix} x + \begin{bmatrix} -6 \\ 2 \end{bmatrix} e^{-2t}$$