Name (Last, First): _____

Student ID: _____

1. Find a general solution to the homogeneous equation:

$$\left(\frac{d}{dt} - 5\right)^3 \left(\frac{d^2}{dt^2} + 4\right) y = 0$$

2. Let
$$\mathbf{x}_1 = \begin{bmatrix} -\sin t \\ \cos t \end{bmatrix}, \quad \mathbf{x}_2 = \begin{bmatrix} \cos t \\ \sin t \end{bmatrix}.$$

Determine if $\{\mathbf{x}_1, \mathbf{x}_2\}$ form a fundamental solution set of the system:

$$\mathbf{x}' = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \mathbf{x}$$