Math 3331
Ordinary Differential Equations
Sample Test 3

1. Solve the following using the variation of parameters

$$(i) \qquad y'' + y = \tan x,$$

$$(ii) \qquad y'' + 3y' + 2y = \frac{1}{e^x + 1}.$$

2. Solve the following systems

$$(i) \qquad \frac{d\bar{x}}{dt} = \begin{pmatrix} 1 & 1 \\ 2 & 0 \end{pmatrix} \bar{x},$$

$$(ii) \qquad \frac{d\bar{x}}{dt} = \begin{pmatrix} 1 & -1 \\ 1 & 3 \end{pmatrix} \bar{x}, \quad \vec{x}(0) = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$$

$$(iii) \qquad \frac{d\bar{x}}{dt} = \begin{pmatrix} 6 & -1 \\ 5 & 4 \end{pmatrix} \bar{x}.$$