HW 18

3) $x'(t) = x(t)(1 - x(t) - y(t))$

$y'(t) = x(t)(3 - 2x(t) - y(t))$

i) $x = x(1 - x - y)$

$y = x(3 - 2x - y)$

$0 = x(1 - x - y)$

$0 = x(3 - 2x - y)$

$0 = x - x^2 - xy$ $\quad x = 2 \quad y = -1$

$0 = 3x - 2x^2 - xy$ $\quad x = 0 \quad y =$ all real numbers

$$J(x,y) = \begin{vmatrix} f_x & f_y \\ g_x & g_y \end{vmatrix}$$

$$= \begin{vmatrix} 1 - 2x - y & (-x) \\ 3 - 4x - y & (-x) \end{vmatrix}$$

$$J(2,-1) = \begin{vmatrix} 1 - 4 + 1 & (-2) \\ 3 - 8 + 1 & (-2) \end{vmatrix} = \begin{vmatrix} -2 & -2 \\ -4 & -2 \end{vmatrix}$$

$$J(0,0) = \begin{vmatrix} 1 & 0 \\ 3 & 0 \end{vmatrix}$$

$$J(0,-5) = \begin{vmatrix} 6 & 0 \\ 8 & 0 \end{vmatrix}$$

$$J(0,5) = \begin{vmatrix} -4 & 0 \\ -2 & 0 \end{vmatrix}$$