$\det A = 12 - 12 = 0 \Rightarrow$ ok, $\vec{x} \neq 0 \ \exists$

(b)

$$\begin{bmatrix} 3 & 6 \\ 2 & 4 \end{bmatrix}\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

(c)

$\det A = 0 \Rightarrow$ ok, $\vec{x} \neq 0 \ \exists$

$$\begin{bmatrix} 1 & 0 & 0 \\ 1 & 2 & 2 \\ 2 & 2 & 2 \end{bmatrix}\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

9. Consider the following statements.

(a) Given an n by n matrix, A, if $\det A = 0$, then the inverse of A exists.
T **F** **Can't tell**

(b) If the Wronskian of two solutions of a certain linear ODE is not zero, then the solutions are linearly independent.
T **F** **Can't tell**

(c) Three solutions of a second order linear ODE are necessarily linearly dependent.
T

(d) All solutions of the differential equation $y'' + y = 0$ can be obtained as a linear combination of the functions $\sin(t-1)$ and $\sin(t+1)$.
T **F** **Can't tell**

(e) All solutions of the differential equation $y'' + y = 0$ can be obtained as a linear combination of the functions $\sin(t-1)$ and $\cos(t-1)$.
T **F** **Can't tell**

(f) If the Wronskian of two functions $y_1(t)$ and $y_2(t)$ is zero at $t = t_0$, then the two functions $y_1(t)$ and $y_2(t)$ are linearly dependent.
T **F** **Can't tell**

(g) If the Wronskian of two solutions $y_1(t)$ and $y_2(t)$ of a second order linear ODE is zero at $t = t_0$, then the two functions $y_1(t)$ and $y_2(t)$ are linearly dependent.
T **F** **Can't tell**

$W = e^{-\int^t p(s)\,ds}$ $\int p(t) = -\log t \Rightarrow W = t$ & $t \neq 0$!

10. Be able to set up and solve applications-type problems such as problems 10 (financing) and 25 (mixing) in section 2.5 and problem 21 (populations) in section 2.6.

$\boxed{p(t) = -1/t}$!