Name:

1. Answer the following statements with either "true" or "false."

   (a) Let A and B be $n \times n$ matrices. Then $(AB)^T = A^T B^T$.

   (b) Let A be a symmetric $n \times n$ matrix. Then $\det A \geq 0$.

   (c) Let y_1 and y_2 be linearly independent solutions to a differential equation $y'' + p(t)y' + q(t)y = 0$, where p and q are continuous on $\mathbb{R}$, and suppose $y_1''(0) = 0$. Then $y_2''(0) \neq 0$.

2. (a) Give the general solution to the following system of differential equations.

$$\mathbf{x}'(t) = \begin{pmatrix} 1 & 9 \\ 1 & 1 \end{pmatrix} \mathbf{x}(t) \tag{1}$$

(b) Which type of equilibrium point is the origin for the system (1)? Circle one.

- source
- sink
- saddle point
- spiral in
- spiral out
- periodic