Name: ____ ____________ / **10**

There are 10 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. (1 point) Complete the following statement:

   A subset $S = \{\vec{s_1}, \vec{s_2}, \cdots, \vec{s_n}\}$ of a vector space is linearly independent if and only if $c_1\vec{s_1} + c_2\vec{s_2} + \cdots c_n\vec{s_n} = \vec{0}$

2. (3 points) Show that the set $S = \{f(x) = x^2, g(x) = e^x\}$ is linearly independent in the vector space of all functions from $\mathbb{R}$ to $\mathbb{R}$.

3. (1 point) State the definition of a basis.

4. (4 points) It is a fact that $B = \langle \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix}, \begin{pmatrix} 1 & 1 \\ 0 & 0 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 1 & 0 \end{pmatrix}, \begin{pmatrix} 0 & 0 \\ 1 & -1 \end{pmatrix} \rangle$ is a basis for $\mathscr{M}_{2\times 2}$ the vector space of all 2 by 2 matrices.

   (a) Confirm that B spans $\mathscr{M}_{2\times 2}$.

   (b) Represent $\vec{v} = \begin{pmatrix} 1 & 2 \\ -3 & 4 \end{pmatrix}$ with respect to the basis B.