Name:

Math 254 Fall 2012 Exam 6

Please read the following directions:
Please print your name in the space provided, using large letters, as "First LAST". Books, notes, calculators, and other aids are not permitted on this exam. Please write legibly, with plenty of white space. Please put your answers in the designated areas. Show all necessary work in your solutions; if you are unsure, show it. Cross out work you do not wish graded; incorrect work can lower your grade. All problems are worth 5-10 points; your total will be scaled to the standard 100 point scale. You have approximately 30 minutes.

Extra credit may be earned by handing in revised work in class on Friday 10/26; for details see the syllabus. You will find this exam on the instructor's webpage soon.

1. Carefully state the definition of "dimension". Give two examples that are each associated to subspaces of $\mathbb{R}^4$.

2. Let V be a vector space with basis $S = \{s_1, s_2, s_3\}$. The representation (in basis S) is a map $[\ ]_S : V \to \mathbb{R}^3$. Prove that $[\ ]_S$ is a linear transformation.

3. Consider the vector space $P_2(t)$. Determine if $S = \{t^2+2, t^2+t+3, t^2-t+1\}$ is independent.

4. In the vector space $\mathbb{R}^2$, set $S = \{(2,3),(5,8)\}$, a basis. Find the change-of-basis matrix from the standard basis E to S, and use this matrix to find $[(7,11)]_S$.

5. In the vector space $M_{2,2}(\mathbb{R})$, the set of 2×2 matrices, set $A = \left(\begin{smallmatrix} 1 & 2 \\ 0 & 1 \end{smallmatrix}\right)$, $B = \left(\begin{smallmatrix} 2 & 0 \\ 1 & -1 \end{smallmatrix}\right)$, $C = \left(\begin{smallmatrix} -3 & 2 \\ -2 & 3 \end{smallmatrix}\right)$. Set $V = Span(\{A, B, C\})$. Find the dimension of V, and a basis.