Name:

Math 254 Fall 2013 Exam 10

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 11/22; for details see the syllabus. You will find this exam on the instructor's webpage later today.

1. Carefully state the definition of "dependent". Give two examples from $P_3(t)$.

2. Let $M \in M_{3,3}$. Suppose that M is similar to I_3, the identity matrix. Prove that $M = I_3$.

3. Let $f : \mathbb{R}^2 \to \mathbb{R}^2$ be the linear mapping defined as $f((a, b)) = (2a, a - b)$. Let $S = \{(1, -2), (1, -1)\}$ be a basis for $\mathbb{R}^2$. Find $[f]_S$.

4. Let V be the vector space of functions that have as a basis $S = \{e^{3t} \sin 2t, e^{3t} \cos 2t\}$. Find the matrix representation $[\frac{d}{dt}]_S$.

5. Let V be the vector space of functions that have as a basis $S = \{e^{3t} \sin 2t, e^{3t} \cos 2t\}$. Let I_v denote the identity linear mapping on V. Find the rank of $\frac{d}{dt}$, and of $(\frac{d}{dt} - I_v)$.