

Name:

Math 254 Fall 2014 Exam 5

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 Wednesday 10/15; for details see the syllabus. You will find this exam on the instructor’s webpage later today.

1. Carefully state the definition of “vector space”. (you need not list the axioms). Give two explicit examples.

2. Give the standard basis for $M_{3,2}$.

The remaining three problems concern the vector space $V = \mathbb{R}^4$ and the subspaces
 $S = \{(a, b, c, d) : a + b = c + d = 0\}$, $T = \{(a, b, c, d) : a + c = b + d = 0\}$.

3. Find a basis for $S \cap T$.

4. Find a basis for S , a basis for T , and a basis for $S + T$.

5. Use your above answers to find the dimensions of the four vector spaces $S, T, S \cap T, S + T$, and interpret these in terms of the Dimension Theorem.