Math 254 Fall 2013 Exam 9

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. The first two problems are worth 5-10 points, while the rest are worth 1-2 points. You have approximately 30 minutes.

Extra credit may be earned by handing in revised work in class on Friday 11/15; 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". Give two three-dimensional examples. (you need not list all the axioms)

2. Consider the linear mapping $g : \mathbb{R}^3 \to P_2(t)$ given by $g((a, b, c)) = a + (b + c)t + at^2$. Find a basis for the kernel of g, and find a basis for the image of g.

Fill in each of the following blanks with the best choice from:
(A) Scalar, (B) Vector, (C) Finite Set of Vectors, (D) Vector Space, (E) None of the above.

3. $P_2(t)$ is a _____.

4. $\mathbb{R}^3$ is a _____.

5. $M_{2,2}$ is a _____.

6. $(1,2,3)$ is a _____ in $\mathbb{R}^3$.

7. $\{(1,2,3)\}$ is a _____ in $\mathbb{R}^3$.

8. $\{1,2,3\}$ is a _____ in $\mathbb{R}^3$.

9. $1+2t$ is a _____ in $P_2(x)$.

10. $1+2t$ is a _____ in $P_2(t)$.

11. $\{1+2t\}$ is a _____ in $P_2(t)$.

12. $(1,2t)$ is a _____ in $P_2(t)$.

13. $\{(1,2t)\}$ is a _____ in $P_2(t)$.

14. $\{1,2t\}$ is a _____ in $P_2(t)$.

15. We take the span of a _____.

16. A basis of $P_2(t)$ is a _____.

17. In $M_{2,3}$, a _____ can be dependent.

18. In $M_{2,3}$, a _____ can be a subspace.

19. A norm takes as input a _____.

20. A norm produces as output a _____.

21. An inner product inputs two _____.

22. An inner product outputs a _____.

23. The domain of a linear transformation is a _____.

24. The input to a linear transformation is a _____.

25. The sum of two vectors is a _____.

26. The sum of two scalars is a _____.

27. The sum of a vector and a scalar is a _____.

28. The sum of a vector and a vector space is a _____.

29. The sum of two subspaces is a _____.

30. In $P_2(t)$, the product of a scalar and a vector is a _____.

31. In $P_2(t)$, the product of two scalars is a _____.

32. In $P_2(t)$, the product of two vectors is a _____.

33. The intersection of two subspaces is a _____.

34. The intersection of two sets of vectors is a _____.

35. The intersection of two vectors is a _____.

36. The rowspace of a matrix is a _____.

37. The kernel of a linear transformation is a _____.

38. The image of a linear transformation is a _____.

39. The solution set to a homogeneous linear system is a _____.

40. The span of a set of vectors is a _____.