

Answers to the practice problems for Exam II

This is for your references. There might be typos due to typewriting or miscalculation.

1. $v = (\sqrt{5}, 2\sqrt{5})$.
2. a) nullity=3, a basis for the null space $\{(-2, -2, 1, 0, 0), (-1, 1, 0, -2, 1)\}$
b) rank=3 c) a basis for the column space $\{(1, 0, 1, 2), (1, 1, -1, 1), (1, 1, 0, 0)\}$.
View the vectors in c) columnwise.
d) $\{(1, 0, 2, 0, 1), (0, 1, 2, 0, -1), (0, 0, 0, 1, 2)\}$.
e) The orthogonal complement of row space of $A =$ the null space of A . The same vectors in a) form a basis for such space.
3. $-26/7v_1 - 29/7v_2 = v_4$.
4. $d = 5$.
5. v_1, v_2, v_3 are linearly dependent. v_1, v_2 form a basis for W . $\dim W = 2$.
 $u \notin W$.
6. a) Linearly independent. b) Linearly dependent. c) linearly dependent.
d) no. e) yes. f) yes. g) yes. h) no. i) no.
7. $(1, -1, -1, 2), (0, 1, 2, 0), (2, -1, 0, 2)$.
8. $(0, 1, 1), (1, -1, 0)$ form a basis. $\dim W = 2$.
9. $(-1, 1, 0), (-2, 0, 1)$.
10. $(1, 1, 1, 0), (0, 0, 1, 1), (1, 0, 0, 0), (0, 0, 0, 1)$.
11. $[v]_S = (-2, -4, 6), [v]_T = (0, 0, 2)$.
12. $(-1, 1, 0), (-1, -1, 1)$.
13. $1/\sqrt{3}(1, 1, 0, 1), 1/\sqrt{2}(1, 0, 0, -1), 1/\sqrt{3}(1, 0, 1, -1)$.
14. $1/\sqrt{3}(-1, 1, 0, 1), 1/\sqrt{3}(0, -1, 1, 1)$.
15. The two given vectors together with $(0, 1, 0, 0), (0, 0, 0, 1)$.

16. skip. see lecture notes.
17. skip. see lecture notes.
18. $(0, 4, 4)$.
19. $2\sqrt{3}$.
20. W is the zero vector space, so the orthogonal complement of W is R_3 .
The standard basis, e_1, e_2, e_3 , is an orthonormal basis.
21. $y = 3 + 1/2x$.
22. skip.