Math 3333 homework

22. (4/9) 5.3 # 11, 12 (where the length of x is defined by $\| x \| = (x, x)^{1/2}$), 15, 16 (expand the left-hand side of the formula using the fact that $\| x \|^2 = (x, x)$), 19 (first assume that the equality holds and check that $(u, v) = 0$, then assume that $(u, v) = 0$ and show that equality holds)

23. (4/9) 5.3 # 20, 21, 23, 30, 41

24. (4/9) 6.1 # 1, 3 (for 1 and 3, verify that each one is or is not linear), 7, 8, 10 (find $L(e_1)$ and $L(e_2)$), 12, 13 (the easiest way is to find the standard matrix representation of L and use it to do (a) and (b)), 18, 19

25. (4/19) 6.2 # 2, 3, 5, 6, 10, 13(a)(b)

26. (4/19) 6.3 # 1 (it will save a lot of work to first get a general formula for $\begin{bmatrix} a \\ b \end{bmatrix}_T$), 5, 6, 13, 17 (it's interesting to note that the representation matrices in (a) and (b) are exactly the change-of-basis matrices found in section 4.8), 18, 19

27. (4/19) 3.1 # 5, 6, 8, 13, 14(a), 15

28. (4/19) 3.2 be able to do 1, 2, 7, 24-26, turn in # 3, 4, 5, 8, 9, 10, 25, 26

29. 3.3 # 1, 3, 11, 12

30. 3.4 # 1, 2, 9, 13 (Suppose there were some A that is singular but its adjoint $\operatorname{adj}(A)$ is nonsingular. From the fact that $A \operatorname{adj}(A) = \det(A) I_n = Z_{n,n}$ we would have $A = Z_{n,n}(\operatorname{adj}(A))^{-1} = Z_{n,n}$ and then (why?) $\operatorname{adj}(A) = Z_{n,n}$. But then $\operatorname{adj}(A)$ would not have been nonsingular. So it's impossible to have A is singular and $\operatorname{adj}(A)$ nonsingular.), 14

31. Study the analysis of the example $A = \begin{bmatrix} 4 & 3 \\ 5 & 4 \end{bmatrix}$ that we did in class. 7.1 # 2, 5

32. 7.1 # 7, and more from 6 and 8 if needed

33. 7.2 # 3, 4, 5, 11(a)(b)(d), 12, 13, 21