

Math 333 (2015) - Homework 2

Due: September 24, 2015.

NAME: _____

Most of the homework is a selection of exercises chosen from the textbook.

- 1) Section 1.6: #18a
- 2) Section 1.7: #27 First compute $\det(A)$ as a function of x and do not "expand".
- 3) Section 1.8: #24a Show neither additivity nor homogeneity properties hold
- 4) Section 1.8: #27
- 5) Section 1.8: #True-False questions (a)-(e)
- 6) Let A, B, C be square matrices with $\det(A) = 2, \det(B) = 3, \det(C) = 4$. Compute the determinant of $X = (AB)^{-1}CB^T$. My notes give the best summary of determinant properties for this one.
- 7) Let $T_A : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ and define $T_A(x)$ to be the projection of x onto the unit vector \hat{u} in the direction of $u = (1, -2, 2)$. Using my notes as a guide, find the matrix A such that $T_A(x) = Ax$.
- 8) Let $T_A : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ be a matrix linear transformation with $T_A(x) = Ax$. Suppose we know

$$T_A(u) = \begin{pmatrix} 3 \\ 4 \end{pmatrix} \quad , \quad T_A(v) = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$$

for vectors u and v . We also know

$$2u + v = e_1 \quad , \quad u + 3v = e_2$$

where e_k are the standard basis vectors. Use the linearity properties (i)-(ii) in Theorem 1.8.2 to compute the matrix A defining T_A .