Math 551 Exam II Spring 1999

NAME _____

1. Compute $\quad det \begin{bmatrix} x & x & -2y+x & -1 \\ 2+x & x & 3y+x & 4 \\ x & x & 3y+x & 2 \\ x & x & 3y+x & 3 \end{bmatrix}$

2. Let $A:\ \text{span}\,\{e_1+e_2, e_2-e_3, e_3\} \to\ \text{span}\,\{f_1, f_1+f_2, f_3\}$

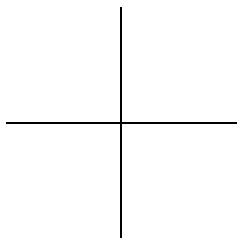
be given by $\qquad A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & \text{-4} \end{bmatrix}$

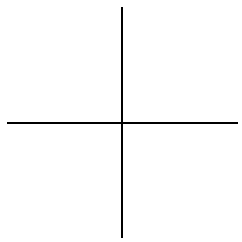
Find A in the bases $\{e_1-e_2, e_2, e_2+e_3\} \to \{f_2+f_1, f_2, f_3+f_2\}$.

3. (a) Find matricies for each of the following maps from $\mathbb{R}^2 \to \mathbb{R}^2$ using the standard bases.

i)

f_1:

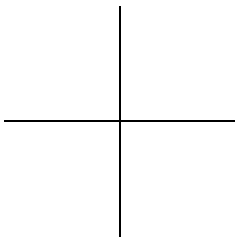


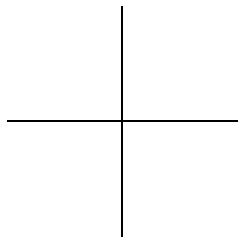


$f_1 = \begin{bmatrix} \quad & \quad \\ \quad & \quad \end{bmatrix}$

ii)

f_2:

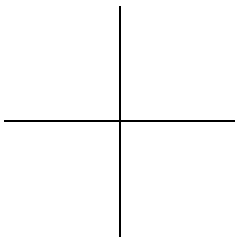


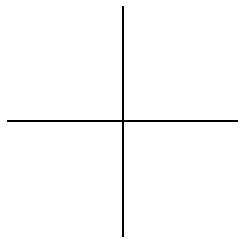


$f_2 = \begin{bmatrix} \quad & \quad \\ \quad & \quad \end{bmatrix}$

3. (b)(i) Draw the image of the flag under a map which is not linear.

N:





(ii) How do you know that your map cannot be linear?

4. Let $S : P_1 \to P_1$; $S(f(x)) = f(5x+2) - 2f(x)$. Compute $det(S)$.

5. Let $T:\ \text{span}\,\{e^x, e^{2x}, e^{3x}\} \to\ \text{span}\,\{\sin x, \cos x, \sin 2x, \cos 2x\}$;

$$T = \begin{bmatrix} 2 & 1 & 3 \\ -1 & -1 & -2 \\ 3 & 2 & 5 \\ 4 & 2 & 6 \end{bmatrix} \text{ in the given bases.}$$

Let $W = \{T(v) | v \in\ \text{span}\,\{e^x, e^{2x}, e^{3x}\}\}$.

Find a basis for W.