Math 220 Assignment

November 26, 2001

Due Wednesday, November 28

1. Find the matrices for change of basis in both directions between the standard basis of $\mathbf{R}^3$ and the basis formed by the columns of the matrix

$$
\begin{pmatrix}
3 & 6 & 2 \\
2 & -3 & 6 \\
6 & -2 & -3
\end{pmatrix} \quad .
$$

2. Let f be the linear function from $\mathbf{R}^3$ to $\mathbf{R}^3$ that has the matrix

$$
D = \begin{pmatrix}
2 & 0 & 0 \\
0 & 1 & 0 \\
0 & 0 & 3
\end{pmatrix}
$$

   relative to the basis of $\mathbf{R}^3$ given by the columns of the matrix in the previous exercise.

   (a) How many lines L passing through the origin have the properly that f carries each point of L to a point of L?

   (b) Find all points x in $\mathbf{R}^3$ for which $f(x) = x$.

   (c) For each of two different lines through the origin find a point on the line that is carried to another point on the same line.

3. Find the matrix of one of the two rotations through the angle $\pi/2$ about the axis in $\mathbf{R}^3$ containing the origin and the point $(1, 1, 1)$.

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