Name: Tuesday section time:
Student ID:

Math 20F - Linear Algebra - Winter 2003

Quiz #6 — February 25

(Do not discuss the quiz with students who haven't taken it yet – until 8:00pm.)

1. Let $L(\mathbf{x})$ be the linear transformation $L : \mathbb{R}^2 \to \mathbb{R}^2$ which transforms the point $\mathbf{x}$ by rotating it 45 degrees clockwise around the origin. What is the matrix that represents L?

   ANSWER:
   $$\begin{pmatrix} \frac{\sqrt{2}}{2} & \frac{-\sqrt{2}}{2} \\ \frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} \end{pmatrix}$$

2. Now let $L : \mathbb{R}^3 \to \mathbb{R}^2$ be defined by
   $$L : \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} \mapsto \begin{pmatrix} x_1 + 2x_2 + 3x_3 \\ x_3 - x_1 \end{pmatrix}.$$
   What matrix represents L?

ANSWER:
$$\begin{pmatrix} 1 & 2 & 3 \\ -1 & 0 & 1 \end{pmatrix}$$