Math 155A - Fall 2022 - Quiz #11 - November 1

Name:

PID:

1. Let f be the linear transformation of $\mathbb{R}^2$ defined by

$$f(\langle x, y\rangle) = \begin{pmatrix} 2 & 0 \\ 1 & 3 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

Suppose $\mathbf{p} = \langle 0, 3\rangle$ and that $\langle 2, -1\rangle$ is normal to $\mathcal{C}$ at $\mathbf{p}$. Give a vector $\mathbf{m}$ that is normal to the point $f(\mathbf{p})$ on the transformed curve $f(\mathcal{C})$. (It does not need to be a unit vector.)

2. Now let g be the affine transformation of $\mathbb{R}^2$ defined by

$$f(\langle x, y\rangle) = \begin{pmatrix} 2 & 0 \\ 1 & 3 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} 0 \\ 2 \end{pmatrix}$$

(So g is the composition of f and a translation.) Again suppose $\mathbf{p} = \langle 0, 3\rangle$ lies on a curve $\mathcal{C}$ and that $\langle 2, -1\rangle$ is normal to $\mathcal{C}$ at $\mathbf{p}$. Give a vector $\mathbf{m}$ that is normal to the point $g(\mathbf{p})$ on the transformed curve $f(\mathcal{C})$.