MATH 241 Spring, 2010 Quiz #1 Name:_____

1. Sketch the surface $z = 1 - y^2$ in (x, y, z)-space.

2. Find the terminal point Q of $\mathbf{v} = \langle 1, 2, -3 \rangle = \hat{\mathbf{i}} + 2\hat{\mathbf{j}} - 3\hat{\mathbf{k}}$ if the initial point P is $(-2, 1, 4)$. Also find the length of $\mathbf{v}$.

3. Compute the orthogonal projection of $\mathbf{w} = \langle 1, -1, 2 \rangle$ on $\mathbf{v} = \langle 1, 2, -3 \rangle$ (that is, $\mathbf{a} = \text{proj}_{\mathbf{v}}\, \mathbf{w}$, the component of $\mathbf{w}$ in the direction of $\mathbf{v}$). Then compute the component of $\mathbf{w}$ that is orthogonal to $\mathbf{v}$; call this vector $\mathbf{b}$. Finally, verify that $\mathbf{a}$ is orthogonal to $\mathbf{b}$.