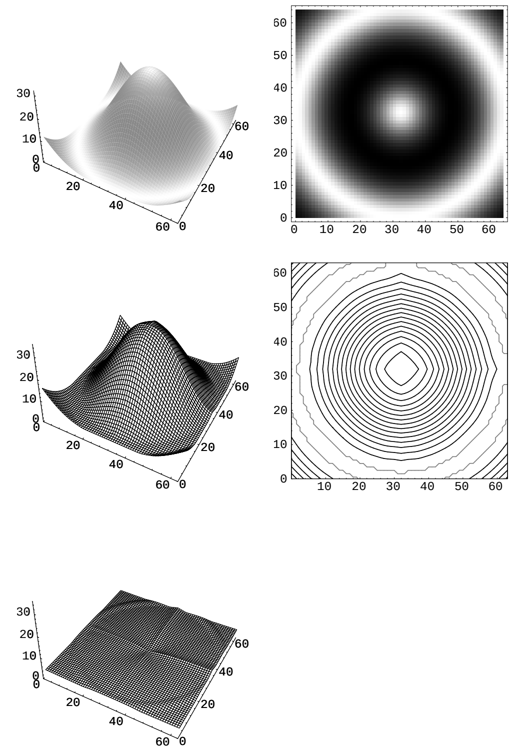


**g**

Figure 4.5 (Continue): **g.** The light source direction is from above ($\hat{l} = \hat{z}$).

The next two examples show the reconstruction of a nose and face form real images. Figure 4.6 presents a low resolution, low quality image of a nose taken by a CCD camera, and the reconstructed surface displayed from three different view points. The first contour was selected to be around the singular area at the tip of the nose.

The second example, Figure 4.7, is an attempt to apply the algorithm to a facial image containing texture, background non Lambertian face, etc. In Chapter 1 Figure 1.2 the equal hieght contours of this image are presented. Though the reconstruction is obviously not perfect, it is possible to learn about the $3D$ shape of the face from the reconstructed surface. Observe the way the eyebrow is reconstructed to be concave instead of convex due to topological errors that can not be avoided. In the next chapter we address such problems by adding a new kind of smoothness assumption that will help resolve the topology ambiguity.

## 4.6 Chapter Summary

We have described a method for recovering the shape of a smooth object from its shaded image by an equal height contour propagation method and gave a new formulation to the

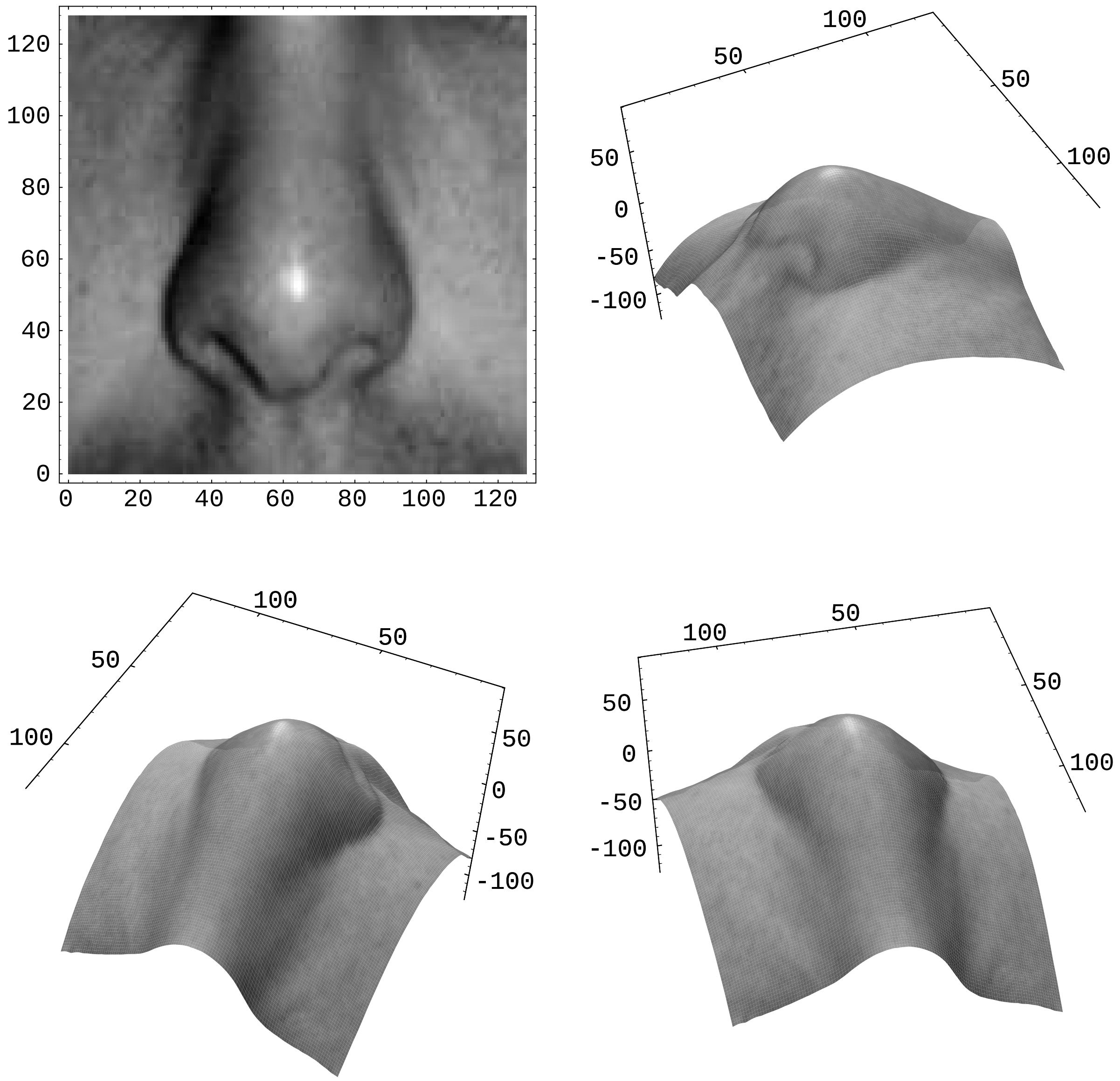


Figure 4.6: Reconstruction of real images given on $128 \times 128$ grid. A "real" nose and the reconstructed surface from three different view points. The process starts at the tip of the nose.