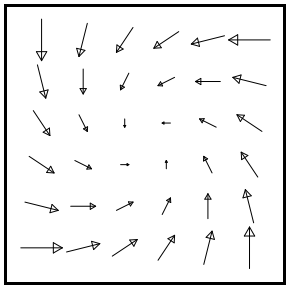
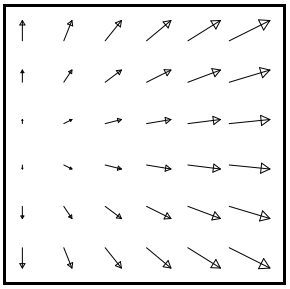
MTH 255 **HW #8** Spring 2004

1. Decide whether the vector fields below have a nonzero curl at the center of the region shown. In each case, the vector field is shown in the xy-plane; assume it has no z-component and is independent of z.





2. A smooth vector field $\vec{\boldsymbol{G}}$ satisfies

$$\left(\vec{\nabla} \times \vec{\boldsymbol{G}}\right)\Big|_{(0,0,0)} = 2\,\hat{\boldsymbol{\imath}} - 3\,\hat{\boldsymbol{\jmath}} + 5\,\hat{\boldsymbol{k}}$$

Estimate the circulation $\oint \vec{\boldsymbol{G}} \cdot d\vec{\boldsymbol{r}}$ around a circle of radius 0.01 centered at the origin in each of the following planes:

(a) xy-plane, oriented counterclockwise when viewed from the positive z-axis.

(b) yz-plane, oriented counterclockwise when viewed from the positive x-axis.

(c) xz-plane, oriented counterclockwise when viewed from the positive y-axis.