**Computing divergence and curl**

1. Compute the divergence for each of the following vector fields.

   (a) $\vec{F} = x\,\hat{\imath} + y\,\hat{\jmath}$

   (b) $\vec{F} = x\,\hat{\imath} + y\,\hat{\jmath} + z\,\hat{k}$

   (c) $\vec{F} = z\sin(xy)\,\hat{\imath} + (x+y)\,\hat{\jmath} + ze^{x}\,\hat{k}$

   (d) $\vec{F} = -y\,\hat{\imath} + x\,\hat{\jmath}$

   (e) $\vec{F} = \dfrac{x\,\hat{\imath} + y\,\hat{\jmath}}{\sqrt{x^2+y^2}}$

   (f) $\vec{F} = \dfrac{x\,\hat{\imath} + y\,\hat{\jmath}}{x^2+y^2}$

2. Compute the curl for each of the following vector fields.

   (a) $\vec{F} = x\,\hat{\imath} + y\,\hat{\jmath}$

   (b) $\vec{F} = x\,\hat{\imath} + y\,\hat{\jmath} + z\,\hat{k}$

   (c) $\vec{F} = z\sin(xy)\,\hat{\imath} + (x+y)\,\hat{\jmath} + ze^{x}\,\hat{k}$

   (d) $\vec{F} = -y\,\hat{\imath} + x\,\hat{\jmath}$

   (e) $\vec{F} = \dfrac{-y\,\hat{\imath} + x\,\hat{\jmath}}{\sqrt{x^2+y^2}}$

   (f) $\vec{F} = \dfrac{-y\,\hat{\imath} + x\,\hat{\jmath}}{x^2+y^2}$