1. Suppose $\vec{\nabla} \cdot \vec{F} = xyz^2$.

(a) Find $\vec{\nabla} \cdot \vec{F}$ at the point $(1, 2, 1)$.
    Note: You are given $\vec{\nabla} \cdot \vec{F}$, not $\vec{F}$!

(b) Using your answer to part (a), but no other information about the vector field $\vec{F}$, estimate the flux out of a small box of side 0.2 centered at the point $(1, 2, 1)$ and with edges parallel to the axes.

(c) Without computing the vector field $\vec{F}$, calculate the exact flux out of the box.

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

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

Estimate the circulation $\oint \vec{G} \cdot d\vec{r}$ 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.