b) Using Green's theorem, evaluate for the scalar line integral of $\vec{F} = (x^2 - y^2)\hat{i} + 2xy\hat{j}$ over the rectangular region bounded by the line $x = 0, y = 0; x = a, y = b$.

OR

13. a) Evaluate using Gauss' divergence theorem $\iint_S \vec{F} \cdot \hat{n} ds$, where $\vec{F} = (x\hat{i} + y\hat{j} + z^2\hat{k})$ and s is the closed surface bounded by the cone $x^2 + y^2 = z^2$ and the plane $z = 1$.

b) Evaluate by Stoke's theorem $\oint_C (\sin z dx - \cos x dy + \sin y dz)$, where 'C' is the boundary of the rectangle, $0 \le x \le \pi$, $0 \le y \le 1$, $z = 3$.