Q1)(a) Use the divergence theorem to write $\iint_S F \cdot N d\sigma$ as triple integral

$$F = x^3 i + y^3 j + 4k$$

$\Sigma$ : surface of $x^2 + y^2 \leq 9$, $z = 0$ to $1$.

(b) Write the triple integral you obtain above in cylindrical coordinates.

Q2) Use Stokes’ theorem to write line integral $\oint_C F \cdot dR$ as surface integral

$$\iint_S (\text{curl } F) \cdot n d\sigma$$

Give expressions for $n$ and $d\sigma$ (Do not evaluate integral).

$F = \langle xy, yz, xz \rangle$, $\Sigma: x^2 + y^2 + z^2 = 9$, $z \geq 0$. 