1. Use Green’s Theorem to calculate the integral \( \oint_C \vec{F} \cdot d\vec{s} \) for the vector field

\[
\vec{F} = (2xy + x^4, 3xy^2 - \sin(y))
\]

and the curve
2. Use Stokes' Theorem to evaluate the integral

\[ \iint_S \text{curl}(\vec{F}) \cdot d\vec{S} \]

for the surface \( S \) with outward normal vector and vector field \( \vec{F} \) below, where the boundary of \( S \) is the ellipse \( 4x^2 + y^2 = 16 \) in the \( xy \)-plane. This boundary can be parametrized as \( c(t) = (2\cos(t), 4\sin(t), 0) \).

\[ \vec{F} = \langle 3x + 4zx^2, x + y + z, x^2 + y^2 + z^2 \rangle \]