1. Evaluate

\[ \oint_C y^3 \, dx - x^3 \, dy \]

where \( C \) are the two circles of radius 2 and radius 1 centered at the origin with positive orientation.

Hint: Use Green Theorem.

2. Find a potential function \( \phi(x, y) \) for the following conservative vector field.

\[ F(x, y) = (2xe^{xy} + x^2ye^{xy})\hat{i} + (x^3e^{xy} + 2y)\hat{j} \]