Quiz 10. Nov. 28th

1. Determine whether or not $\vec{F}$ is a conservative vector field. If it is, find a function f such that $\vec{F} = \Delta f$.
(a) $\vec{F}(x, y) = y^2\vec{i} + x^2\vec{j}$
(b) $\vec{F}(x, y) = e^{-y}\vec{i} + -xe^{-y}\vec{j}$

2. Show that the line integral $\int_C y^3dx + 3xy^2dy$ is independent of path and evaluate the integral if C is any path from $(0, 0)$ to $(2, 4)$.

3. Use Green's theorem to evaluate the line integral

$$\int_C \sin x \sin y \; dx - \cos x \cos y \; dy$$

where C is the circle $x^2 + y^2 = 4$ oriented counterclockwise.

4. Let D be a simple region in the $xy - plane$ bounded by the smooth positively oriented curve C. If the length of C is 27 and the area of D is 13, evaluate $\int_C y \; dx - x \; dy$.