Quiz 12 (20mins, 30pts)

Please write down your name, SID, and solutions discernably.

Name : SID : Score :

1. (10pts) A particle starts at the point $(-2, 0)$, moves along the x-axis to $(2, 0)$, and then along the semicircle $y = \sqrt{4 - x^2}$ to the starting point. Use Green's Theorem to find the work done on this particle by the force field $\mathbf{F}(x, y) = \langle x, x^3 + 3xy^2 \rangle$

2. (10pts) Find the curl and the divergence of the vector field.

$$\mathbf{F}(x, y, z) = \langle \ln x, \ln(xy), \ln(xyz) \rangle$$

3. (10pts) Determine whether or not the vector field is conservative. If it is conservative, find a function f such that $\mathbf{F} = \nabla f$.

$$\mathbf{F}(x, y, z) = xyz^2\mathbf{i} + x^2yz^2\mathbf{j} + x^2y^2z\mathbf{k}$$