Quiz 13 (Last) (30mins, 40pts)

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

Name : 
SID : 
Score :

1. (10pts) Evaluate the surface integral.

\[ \int \int_{S} x^2 z^2 \, dS, \]

\( S \) is the part of the cone \( z^2 = x^2 + y^2 \) that lies between the planes \( z = 1 \) and \( z = 3 \).

2. (10pts) Find the flux of

\[ \mathbf{F}(x, y, z) = xz \mathbf{i} + x \mathbf{j} + y \mathbf{k} \]

across the hemisphere \( x^2 + y^2 + z^2 = 25, \ y \geq 0 \), oriented in the direction of the positive \( y \)-axis.
3. (10pts) Use Stokes’ Theorem to evaluate \( \iint_S \text{curl} \, \mathbf{F} \cdot \mathbf{n} \, dS \), where \( \mathbf{F}(x, y, z) = x^2yz \mathbf{i} + yz^2 \mathbf{j} + z^3e^{xy} \mathbf{k} \), \( S \) is the part of the sphere \( x^2 + y^2 + z^2 = 5 \) that lies above the plane \( z = 1 \), and \( S \) is oriented upward.

4. (10pts) Use Stokes’ Theorem to evaluate \( \int_C \mathbf{F} \cdot d\mathbf{r} \), where \( \mathbf{F}(x, y, z) = x^2 \mathbf{i} + y^2 \mathbf{j} + z^2 \mathbf{k} \), where \( C \) is the circle which is the intersection of \( z = 1 - x^2 - y^2 \) and \( xy \)-plane, oriented counterclockwise as viewed from above.