Please justify all your steps!

1. (a) Find the area of the triangle with corners (1,2,2), (3,2,1) and (2,0,2).
    (b) Find the equation of the plane which contains the triangle in (a).

2. Calculate the integral \( \int \int_D \cos(x^2 + y^2)dxdy \), where \( D \) is the region given by \( x \geq 0, y \geq 0 \) and \( x^2 + y^2 \leq (\pi/2)^2 \).

3. Evaluate the line integral \( \int_C \mathbf{F} \cdot ds \) for the vector field \( \mathbf{F}(x,y,z) = (y, 2x, y) \) and the path \( C \) given by \( c(t) = (t, t^2, t^3) \) for \( 0 \leq t \leq 1 \).

4. Let \( S \) be the part of the paraboloid \( z = x^2 + y^2 \) which is inside the cylinder \( x^2 + y^2 = 4 \).
    (a) Calculate its surface area
    (b) Calculate the integral \( \int_S (x^2 + y^2)dS \).