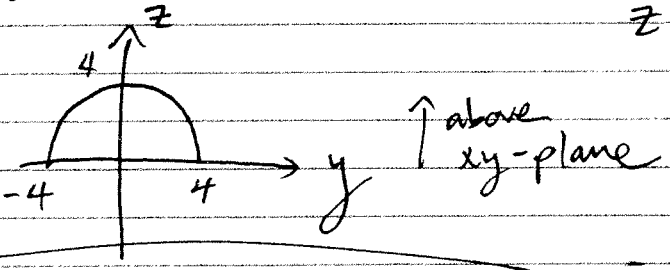
Math 272 | Spring 2010 | Quiz 5

(1) Write down parametric equations for the part of the cylinder $y^2 + z^2 = 16$ with $0 \le x \le 5$ that lies above the xy-plane.

Solution: Cylinder of radius 4: $y = 4\cos\theta$, $z = 4\sin\theta$, $0 \le \theta \le \pi$



$$x(u,v) = u \qquad 0 \le u \le 5$$
$$y(u,v) = 4\cos v \qquad 0 \le v \le \pi$$
$$z(u,v) = 4\sin v$$

(2) Set up but do not evaluate the surface area integral for $z = x^2 - y^2$, $-1 \le x \le 1$, $1 \le y \le 3$. $\left(D = [-1,1] \times [1,3]\right)$

$f(x,y) = x^2 - y^2$

Solution:

$$\iint_D \sqrt{(f_x)^2 + (f_y)^2 + 1}\, dA$$

$$= \int_1^3 \int_{-1}^{1} \sqrt{(2x)^2 + (-2y)^2 + 1}\, dx\, dy = \int_1^3 \int_{-1}^{1} \sqrt{4x^2 + 4y^2 + 1}\, dx\, dy$$