MATHEMATICS 212
ASSIGNMENT 5
Due: March 4, 2015

01° Let ρ and σ be positive real numbers. Let K be the circular disk in $\mathbf{R}^2$ defined by the relation

$$(u,v) \in K \quad \text{iff} \quad u^2 + v^2 \leq \rho^2$$

Let S be the surface in $\mathbf{R}^3$ parametrized by the mapping:

$$H(u,v) = (x,y,z) = (u, v, \sigma\sqrt{u^2+v^2}) \qquad ((u,v) \in K)$$

Draw a picture of S. Compute the surface area of S.

02° Let ρ and σ be positive real numbers. Let K be the circular disk in $\mathbf{R}^2$ defined by the relation

$$(u,v) \in K \quad \text{iff} \quad u^2 + v^2 \leq \rho^2$$

Let S be the surface in $\mathbf{R}^3$ parametrized by the mapping:

$$H(u,v) = (x,y,z) = (u, v, \sigma(u^2+v^2)) \qquad ((u,v) \in K)$$

Draw a picture of S. Compute the surface area of S.

03° Let α, β, and γ be positive real numbers. Let K be the rectangle in $\mathbf{R}^2$ defined by the relation:

$$(\phi,\theta) \in K \quad \text{iff} \quad -\pi < \phi < \pi,\ -\frac{\pi}{2} < \theta < \frac{\pi}{2}$$

Let S be the surface in $\mathbf{R}^3$ parametrized by the mapping:

$$H(\phi,\theta) = (x,y,z) = (\alpha cos(\theta)cos(\phi), \beta cos(\theta)sin(\phi), \gamma sin(\theta)) \quad ((\phi,\theta) \in K)$$

Draw a picture of S. TRY to compute the surface area of S.

04° Let r and s be numbers for which $0 < r < s$. Let K be the subset of $\mathbf{R}^3$ defined by the relations:

$$-\pi \leq v \leq \pi,\ \ -\pi \leq w \leq \pi$$

Let S be the surface in $\mathbf{R}^3$ defined by the mapping:

$$H = (x,y,z) = ((s+r\,cos\,v)cos\,w,\ (s+r\,cos\,v)sin\,w,\ r\,sin\,v) \qquad ((v,w) \in K)$$

Draw a picture of S. Compute the surface area of S.

05$^\bullet$ Find the area of the intersection of a solid circular cylinder and a plane.

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r = 1; s = 2;
ParametricPlot3D[{(s + r * Cos[v]) * Cos[w], (s + r * Cos[v]) * Sin[w], r * Sin[v]},
 {v, -Pi, Pi}, {w, -Pi, Pi}]
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