- Motivation:
- Parametrized surfaces $\mathcal S$ given by $\mathbf r(u,v) = \Big(x(u,v),\ y(u,v),\ z(u,v)\Big)$:
- 1. Determine the surface $\mathbf{r}(u, v) = (u \cos v, u \sin v, u)$.

2. Parametrize the surface $x^2 + y^2 + z^2 = 25$.

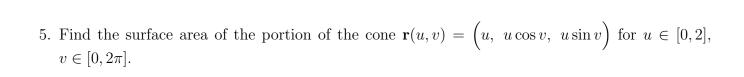
3. Identify the surface $\mathbf{r}(u, v) = (R \cos u, R \sin u, v)$.

• Tangent Plane: For $\mathbf{r}(u,v) = (x(u,v), y(u,v), z(u,v))$, form the tangent vectors \mathbf{r}_u and \mathbf{r}_v .



• Surface Area:

• Surface Integral:



6. Find the surface area of the hemisphere $x^2 + y^2 + z^2 = R^2$ for $z \ge 0$.

7. Evaluate the surface integral $\iint_{\mathcal{S}} xz \ d\mathcal{S}$, where \mathcal{S} is the part of the plane x + y + z = 1 in the first octant.

8. Set up but do not evaluate the iterated integral representing $\iint_{\mathcal{S}} xyz \, d\mathcal{S}$, where \mathcal{S} is the portion of the surface $y^2 = x$ between the planes z = 0, z = 4, y = 1, y = 2.