

1. Let  $r(t) = \langle \cos(t)^3, \sin(t)^3, \cos(t) \rangle$ .

Plot the curve traced out by  $r(t)$  and find its arclength.

2. Let  $r(t) = \langle t \cos(t), t \sin(t), t \rangle$ .

2.1 Show that the graph of  $r(t)$  lies on the surface  $z^2 = x^2 + y^2$ .

2.2 Plot the curve and surface on the same set of axes to demonstrate this.