1. What is the vector function of the intersection of the curves $x^2 + y^2 = 2$ and $3x + z = 7$

**Solution:**

The circle $x^2 + y^2 = r^2$ can be parameterized by:

\[
\begin{align*}
  x(t) &= r \cos(t) \\
  y(t) &= r \sin(t)
\end{align*}
\]

Therefore the given curve can be parameterized for x and y by:

\[
\begin{align*}
  x(t) &= \sqrt{2} \cos(t) \\
  y(t) &= \sqrt{2} \sin(t)
\end{align*}
\]

For the parameterization of z consider $z = 7 - 3x$ obtained from the second of the intersecting curves.

\[
\begin{align*}
  z(t) &= 7 - 3 \sqrt{2} \cos(t)
\end{align*}
\]

The parameterization is obtained by substituting in $x(t)$ for $x$.

So the vector function of the intersection of the curves $x^2 + y^2 = 2$ and $3x + z = 7$ is given by:

\[
\begin{align*}
  x(t) &= \sqrt{2} \cos(t) \\
  y(t) &= \sqrt{2} \sin(t) \\
  z(t) &= 7 - 3 \sqrt{2} \cos(t)
\end{align*}
\]