1.2.9 Convert the vector $\mathbf{B} = 3\mathbf{u}_\rho + 4\mathbf{u}_\phi + 5\mathbf{u_z}$ that is in cylindrical coordinates into Cartesian coordinates. Check your answer using MATLAB.

$$\begin{aligned} x &= \rho \cos\phi \\ &= 3\cos 4 \\ &= -1.96 \end{aligned}$$

$$\begin{aligned} y &= \rho \sin\phi \\ &= 3\sin 4 \\ &= -2.27 \end{aligned}$$

The values of z are the same in both coordinate systems. Therefore, the final vector in cylindrical coordinates is $\mathbf{B} \approx -1.96\mathbf{u}_\rho - 2.27\mathbf{u}_\phi + 5\mathbf{u_z}$.