Problem 3.23 Convert the coordinates of the following points from cylindrical to Cartesian coordinates:

(a) $P_1 = (2, \pi/4, -3)$,

(b) $P_2 = (3, 0, -2)$,

(c) $P_3 = (4, \pi, 5)$.

Solution:

(a)

$$P_1 = (x,y,z) = (r\cos\phi, r\sin\phi, z) = \left(2\cos\frac{\pi}{4}, 2\sin\frac{\pi}{4}, -3\right)$$
$$= (1.41, 1.41, -3).$$

(b) $P_2 = (x,y,z) = (3\cos 0, 3\sin 0, -2) = (3, 0, -2)$.

(c) $P_3 = (x,y,z) = (4\cos\pi, 4\sin\pi, 5) = (-4, 0, 5)$.