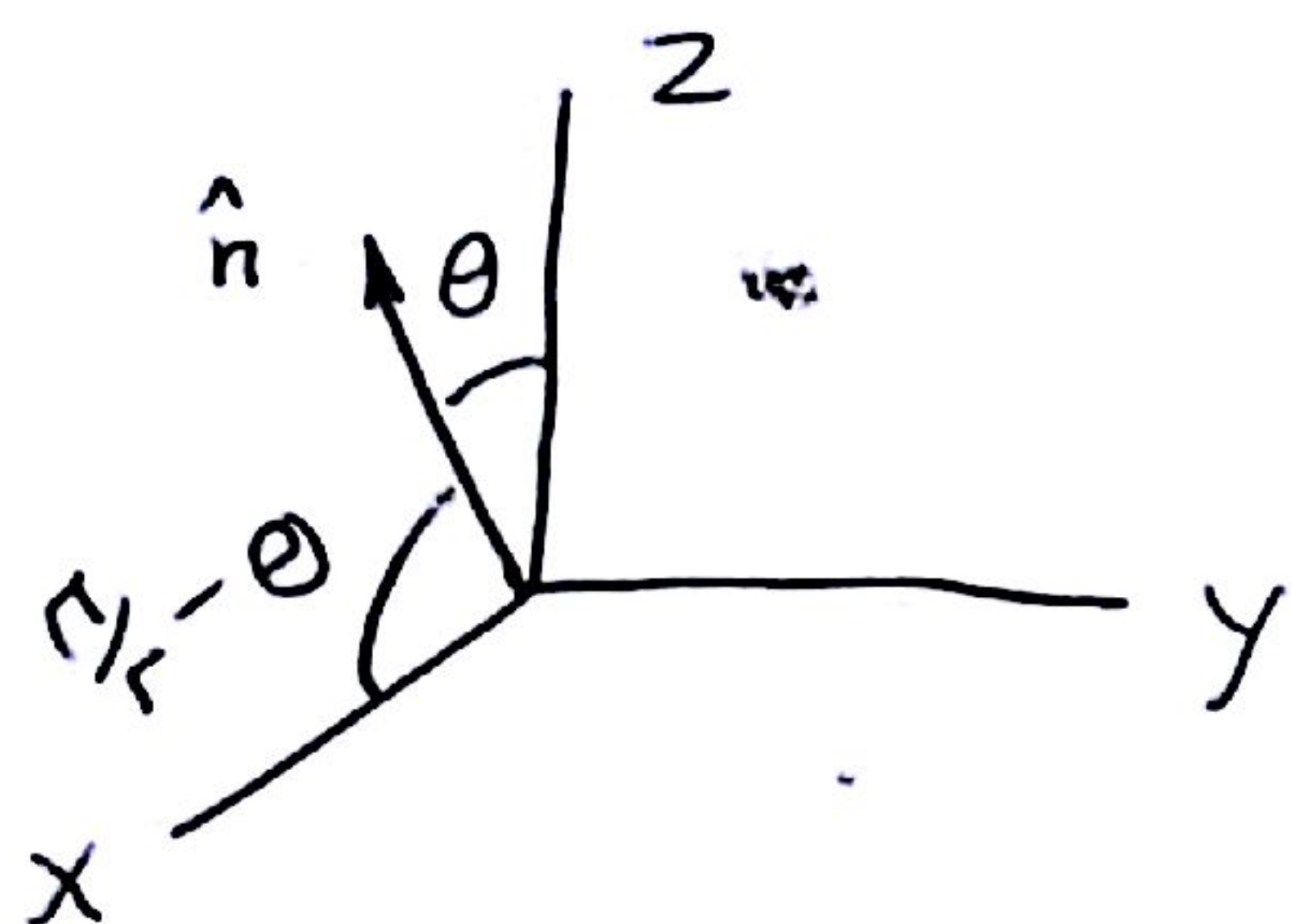


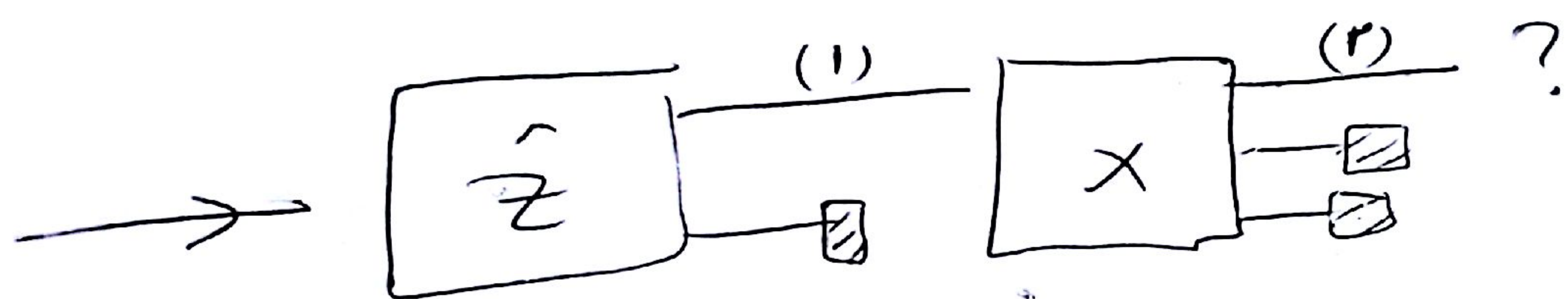
چون کفہ  $|n\rangle$  در صفحه  $x-y$

است پس در شکل مابیل  $\psi = 0$  و بصورت زیر ساده می شود



$$S_n = S \cdot \hat{n} = S_x \sin \theta + S_z \cos \theta = \hbar \begin{pmatrix} \cos \theta & \sin \theta \\ \sin \theta & -\cos \theta \end{pmatrix}$$

$$= \hbar \cos \theta \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} + \hbar \sin \theta \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} = \hbar \cos \theta |+\rangle + \hbar \sin \theta |-\rangle$$



تکرار  
 $\hbar \cos \theta |+\rangle + \hbar \sin \theta |-\rangle$

$$P_z = \cos^2 \theta = (\cos \theta)^2$$

$$P_x = \cos^2 \left( \frac{\pi}{2} - \theta \right) = \sin^2 \theta = (\sin \theta)^2$$

$$P_r = P_z P_x = \cos^2 \theta \sin^2 \theta = (\cos \theta \sin \theta)^2 = \frac{1}{4} \sin^2 2\theta$$

$$C_2^2 I = \frac{1}{4} \hbar^2 \sin^2 2\theta = \left( \frac{\hbar}{2} \sin 2\theta \right)^2$$