Welcome to the first assignment! During this assignment, you will practice your math skills in an environment mor

Given the quantum state $\psi = \sqrt{\frac{1}{3}}0 + \sqrt{\frac{2}{3}}1$. Is ψ a valid quantum state? Explain why. `Write down your soluti`

Given the quantum states $\psi_1 = \frac{3}{5}0 + \frac{4}{5}1$ and $\psi_2 = \frac{3}{5}0 - \frac{4}{5}1$. What is the resulting quantum state $\psi = \psi_2 - \psi_1$? `Wr`

Assume that you can only use the quantum gates from the set $\mathcal{Q} = \{I, X, Y, Z, H\}$. Is it possible to create the qu

Assume that you can only use the quantum gates from the set $\mathcal{Q} = \{I, X, Y, Z, H\}$. Is it possible to create the qu

What state does the S gate transform the quantum state $-i$ into? `Write down your solution here:` $\quad \psi = S-$

[t]
Consider the quantum circuit presented in Figure and assume $q_0 = 0$. Determine, by using the Dirac notation, wh

Consider the quantum circuit presented in Figure . Determine, by using the matrix–matrix multiplication, what is

Consider the quantum circuit presented in Figure and assume $q_0 = 1$. Determine, by using the matrix–vector mult

[t]
Consider the quantum circuit presented in Figure and assume $q_0 = 1$. Determine, by using the Dirac notation, wh

Consider the quantum circuit presented in Figure and assume $q_0 = +$. Determine, by using the Dirac notation, wh