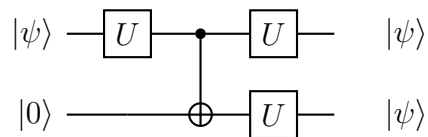


Exercise 12.1

Let $|\psi\rangle = a|0\rangle + b|1\rangle$. Then, $|\varphi\rangle = b|0\rangle - a|1\rangle$.

We require a gate which transforms between the basis of $|\psi\rangle$ and $|\varphi\rangle$, and the computational basis. This can be performed using the unitary, $U = U_{\text{agger}} = \begin{bmatrix} a & b \\ b & -a \end{bmatrix}$. Using U we construct the following circuit which performs the cloning.



Exercise 12.2

Exercise 12.3

Exercise 12.4

Exercise 12.5

Exercise 12.6

Exercise 12.7

Exercise 12.8

Exercise 12.9

Exercise 12.10

Exercise 12.11

Exercise 12.12

Exercise 12.13

Exercise 12.14

Exercise 12.15

Exercise 12.16

Exercise 12.17

Exercise 12.18

Exercise 12.19

Exercise 12.20