In[543]:=
```
k1 = Mod[399 + 367 + 309 + 88, 2]
     modulo
k2 = Mod[399 + 367 + 309 + 88, 2^2]
     modulo
k3 = Mod[399 + 367 + 309 + 88, 2^3]
     modulo
```

Out[543]= 1

Out[544]= 3

Out[545]= 3

In[546]:=
$$\theta 0 = \frac{\pi}{k2}$$
$$\phi 0 = \frac{2\pi}{k3}$$

Out[546]= $\frac{\pi}{3}$

Out[547]= $\frac{2\pi}{3}$

In[548]:=

In[549]:=
```
|1⟩ = {{0}, {1}};
```

In[550]:=
$$u1 = \begin{pmatrix} 1 & 0 \\ 0 & e^{(i * \phi 0)} \end{pmatrix}$$
$$u3 = \begin{pmatrix} \text{Cos}\left[\frac{\theta 0}{2}\right] & -\text{Sin}\left[\frac{\theta 0}{2}\right] \\ \text{Sin}\left[\frac{\theta 0}{2}\right] & \text{Cos}\left[\frac{\theta 0}{2}\right] \end{pmatrix}$$

Out[550]= $\left\{\{1, 0\}, \left\{0, e^{\frac{2 i \pi}{3}}\right\}\right\}$

Out[551]= $\left\{\left\{\frac{\sqrt{3}}{2}, -\frac{1}{2}\right\}, \left\{\frac{1}{2}, \frac{\sqrt{3}}{2}\right\}\right\}$

In[552]:=
```
a = (u1.u3.|0⟩)
```

Out[552]= $\left\{\left\{\frac{\sqrt{3}}{2}\right\}, \left\{\frac{1}{2} e^{\frac{2 i \pi}{3}}\right\}\right\}$

In[553]:=
```
b = (u1.u3.|1⟩) // N // MatrixForm
                pr··· postać macierz
```

Out[553]//MatrixForm=
$$\begin{pmatrix} -0.5 \\ -0.433013 + 0.75\, i \end{pmatrix}$$