Assignment 7
Due by class time Friday, October 7

1. For what values of $\theta$, if any, is the matrix below hermitian? Explain.
\[
\begin{bmatrix}
\cos \theta & -\sin \theta & 0 \\
\sin \theta & \cos \theta & 0 \\
0 & 0 & 1
\end{bmatrix}
\]

2. Show that the above matrix is unitary for any value of $\theta$.

3. Write a Python program called `eigenvals(a, b, c, d)` to compute the eigenvalues of any $2 \times 2$ matrix \[
\begin{bmatrix}
a & b \\
c & d
\end{bmatrix}
\] of real numbers. Your program should compute the eigenvalues using the method we went over in class (i.e., you’re not allowed to use libraries or packages for linear algebra). It should also print out the eigenvalues in a reasonably nice format. You do not need to compute eigenvectors. For example:

```python
>>> eigenvals(0, 1, 1, 0)
lambda1 = 1
lambda2 = -1
```

```python
>>> eigenvals(4, -1, 2, 1)
lambda1 = 3
lambda2 = 2
```

```python
>>> eigenvals(1, 2, -2, 1)
lambda1 = 1+2i
lambda2 = 1-2i
```


5. Extra Credit (optional). Find and fix the typos (there are two) in Equation 2.175 on page 72 of the book, which gives the definition of the tensor product $A \otimes B$ of an $m \times m'$ matrix $A$ and an $n \times n'$ matrix $B$. (Note: the symbol $/$ in the equation denotes integer division.)