Proof cycle and related stuff

How do I prove this? How do I approach thinking about this in terms of proof; How do I go from this conjecture to thinking; we need to start from things we know to be true and arrive here; this method is known as direct proof; there are other methods too, but a proof generally needs an idea;

1. Understand every term of the proof at a cursory level.
2. Understand what is being asked in those terms?
3. Now you understand the task at this point.
4. Ideate and attempt; sketch out promising avenues that look hopeful.
5. Once you have a promising sketch, write it in better detail.
6. Cycle until you reach a satisfactory proof.
7. Write down ideas while Ideating. Think on paper.

0.0.1 Pauli gates on e_i

0.1 Pauli Gates

Quantum gates are simply operators. But since we are doing quantum computation, we adapt the term gate instead of operators.

$$I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad X = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} \quad Y = \begin{bmatrix} 0 & -i \\ i & 0 \end{bmatrix} \quad Z = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$$

I X Y Z

X: bit flip, quantum not

Z: phase flip

$$\begin{aligned} I|0\rangle &= |0\rangle \\ I|1\rangle &= |1\rangle \\ X|0\rangle &= |1\rangle \\ X|1\rangle &= |0\rangle \\ Y|0\rangle &= -i|1\rangle \\ Y|1\rangle &= i|0\rangle \\ Z|0\rangle &= |0\rangle \\ Z|1\rangle &= -|1\rangle \end{aligned}$$