1. Consider the representation $\mathbf{n} \otimes \bar{\mathbf{n}}$ of $SU(n)$. Explain why this is always reducible. Can you identify the irreducible representations and invariant subspaces?

2. (a) Find the transformation of elements of $\mathbf{2} \otimes \mathbf{2}$.

   (b) Show that the representations $\mathbf{2}$ and $\bar{\mathbf{2}}$ are isomorphic by showing they are related by a change of basis

$$\boldsymbol{z}' = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \boldsymbol{z} \tag{0.1}$$

   [Note: of course, $\bar{v}$ transforms also as $\bar{v} \to \bar{g}\bar{v}$ if $v \to gv$. In a complex vector space, complex conjugation is not a change of basis however!]

   (c) Use the above to argue that $\mathbf{2} \otimes \mathbf{2} = \mathbf{1} \oplus \mathbf{3}$. Can you identify the invariant subspaces?