1. Now let $G$ be a group with the presentation
$$G=\left〈a, b|a^{7}=e, b^{3}=e, b^{-1}ab=a^{2}\right〉.$$

You are told that$ \left|G\right|=21$. Let$ w=exp⁡({2iπ}/{7)} \in C$. Prove that there is a representation
$$ρ:G\rightarrow GL(3, C)$$

with
$$ρ\left(a\right)=\left(\begin{matrix}w^{2}&0&0\\0&w^{4}&0\\0&0&w\end{matrix}\right) and ρ\left(b\right)=\left(\begin{matrix}0&0&1\\1&0&0\\0&1&0\end{matrix}\right).$$

1. For the representation $ρ:G\rightarrow GL\left(3, C\right)$ defined in (i) above, let $ρ^{\*}:G\rightarrow GL(3,C)$ be the representation given by $ρ^{\*}\left(g\right)=ρ(g^{-1})^{T}$ for all$ g\in G$. Write down$ ρ^{\*}(a)$ and$ ρ^{\*}(b)$. Are $ρ$ and $ρ^{\*}$ equivalent representations?