Question: 2

Prove that $\mathbb{C}^*$ is isomorphic to the subgroup of $GL_2(\mathbb{R})$ consisting of matrices of the form

$$\begin{pmatrix} a & b \\ -b & a \end{pmatrix}.$$

Solution:

Question: 13

Let $\omega = \text{cis}(2\pi/n)$ be the primitive nth root of unity. Prove that matrices

$$A = \begin{pmatrix} \omega & 0 \\ 0 & \omega^{-1} \end{pmatrix} \quad \text{and} \quad B = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$$

generate a multiplicative group isomorphic to D_n.

Solution:

Question: 18

Prove that the subgroup of $\mathbb{Q}^*$ consisting of elements of the form $2^m 3^n$ for $m, n \in ZZ$ is an internal direct product isomorphic to $\mathbb{Z} \times \mathbb{Z}$.

Solution:

Question: 23

Prove or disprove the following assertion. Let $G, H,$ and K be groups. If $G \times K \cong H \times K$ then $G \cong H$.

Solution:

Question: 29

Show that S_n is isomorphic to a subgroup of A_{n+2}.

Solution:

Question: 36

Prove that $A \mapsto B^{-1}AB$ is an automorphism of $SL_2(\mathbb{R})$ for all B in $GL_2(\mathbb{R})$.

Solution: