12.2 Let $T = \{ E \in \mathbb{C}^D \text{ such that } n \cdot AB \leq 0 \}$

$S$ be the set of points on $CD$ which are not in $T$. If $E_i$ and $E_j$ are in $T$ and $E_i$ is between $E_j$ and $E_k$, then without loss of generality we may assume

$CE > CE_i$, so $CE > n \cdot AB$ for all $n$.

So $E \in T$.

If $E_i$ and $E_j$ are on $S$ and $E_i \neq E_j \neq E_k$, the similar argument shows that $E \in S$.

So there exists $F$ such that for any $E \in S$ and $Y \in T$ we have $X \neq F \neq Y$.

Let $F \in S$ and $F'$ be such that $CF' = CF + AB$. Then $F' \in S$.

Similarly if $CF'' = CF - AB$, then $F'' \in S$.

If $F \in T$, then $F$ cannot lie between $E$ and $F'$, since $CF < CF' < CE$.

Let $F \in T$ and $CF' = CF - AB$, then $F' \in T$, so $F$ does not lie between $E$ and $F'$. Thus, $F$ is not on $T$ and not on $S$. This is possible only if $S$ is empty.
16.8 Following the hint let us show that the unit circle has infinitely many points. Let \( g \) be a rigid motion
\[
x' = \frac{2}{3}x + \frac{1}{3}y \\
y' = -\frac{1}{3}x + \frac{2}{3}y
\]
Then \( g^n \) moves a point in the unit circle to a point on the unit circle. So \( g^n(1,0) \) gives infinitely many points. If \( \Gamma \) is any circle we may assume without loss of generality that the center is at the origin. Then if \((a,b)\) is on \( \Gamma \), \( g^n(a,b) \) is on \( \Gamma \) for all \( n \). Hence \( \Gamma \) has infinitely many points.

17.4 (a) Construct the rotation by
\[
A' = g(A) = A' \\
\]
For any \( B \) there exists a unique \( B' \) such that
\[
OB = OB', \quad \angle BOB' = \angle AOA' \\
\text{and} \quad \triangle AOB \cong \triangle A'OB' 
\]
Then \( AB = A'B' \) by angle side angle property.

8 is a rotation.
\[ A \rho, A \eta \rho, \text{ or } A \text{ is fixed. Thus, } B \text{ is fixed.} \]

One fixed point. Thus, there is a total point(s) of order \( \frac{A}{A} \). Thus, the total point(s) of order \( A \).

So the case \( A \rho, A \eta \rho, \text{ or } A \) is as follows.

If \( \phi = R \) then \( \phi = \phi \circ R \) and \( \phi \circ \phi = \phi \).

If \( \phi \circ \phi = \phi \) then \( \phi = \phi \circ \phi \).

If \( \phi = R \) then \( \phi = \phi \circ R \) and \( \phi = \phi \).

Thus, \( \phi \) is a rotation. Hence, \( \phi \) is a rotation.

Thus, \( \phi \) is a rotation. Hence, \( \phi \) is a rotation.

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