State givens

Given $\triangle ABC$ and $\triangle DEF$ such that

$\overline{AB} \cong \overline{DE}$ (2)

$\overline{BC} \cong \overline{EF}$

$\angle ABC \cong \angle DEF$ (3)

Use application theorem

By the application theorem, there is an isometry, f, such that $f(A) = D$

$f(B) \in \overrightarrow{DE}$ (1)

$f(C)$ is on the same side of $\overleftrightarrow{DE}$ as F (4)

Use theorem 2 to prove $B' = E$

Let $f(B) = B'$, $f(A) = A'$, $f(C) = C'$

We know $B' \in \overrightarrow{DE}$ by line (1)

We know $\overline{DB'} \cong \overline{DE}$ because

$\overline{AB} \cong \overline{DE}$ by line (2)

$\overline{AB} \cong \overline{A'B'} = \overline{DB'}$ f is isometry

So $B' = E$ by theorem 2.

Use theorem 1 to prove C' on $\overrightarrow{EF}$

Now $\angle ABC \cong \angle DEF$ by line (3)

And $\angle ABC \cong \angle A'B'C'$ because f is an isometry

So ~~and C is~~ $\angle DEF \cong \angle A'B'C' = \angle DEC'$ and C' on same side as F (4)

So by theorem 1 $\overrightarrow{EC'} = \overrightarrow{EF}$

($C' \in \overrightarrow{EF}$ and $F \in \overrightarrow{EC'}$)

Use thm. 2 to prove $C' = F$

We know $C' \in \overrightarrow{EF}$ by line

We know $\overline{EC'} \cong \overline{EF}$ because ...

So $C' = F$ by theorem 2