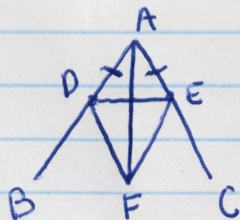# Homework 10 #8

Euclid's proof of proposition 9 uses proposition 8 as one ingredient. Find a proof of proposition 9 which only uses facts from Euclid that come <u>before</u> proposition 6.

Proposition 9: To bisect a given rectilineal angle.

- let $\angle BAC$ be the given rectilineal angle.
- By postulate 2 construct D on AB.
- By proposition 3 cut off AE from AC, AE=AD.
- By postulate 1 connect DE
- By proposition 1 create the equilateral triangle, $\triangle DEF$
- By postulate 1 connect AF.
- By definition 20, $\triangle ADE$ is an isoceles triangle and so is $\triangle DEF$
- By common notion 2 ~~Proposition 5~~ $\angle ADF = \angle AEF$ and $\angle FDE = \angle FED$.
  Now by CN2, $\angle ADF = \angle AEF$.
- By proposition 4 $\triangle DAF \cong \triangle EAF$
- Therefore AF bisects $\angle BAC$ as claimed

$$Q.E.D.$$