Homework 5, #6

Proof:

Given: The lines that look straight are straight. $\angle D = \angle 1$, $KM = TM = CM$

Prove: $AD = BC$

- By Theorem 5b, $KM = DM$ because $\angle 1 = \angle D$ (given)
- By Theorem 5a, $\angle MCT = \angle MTC$.
- By the given, $KM = TM$ and $TM = CM$, so by algebra, $\angle 1 = \angle D = \angle MCT = \angle MTC$.
- By Thm 1b, $\angle KMD = \angle TMC$.
- By BF3, $\triangle KMD \cong \triangle TMC$ because $\angle KMD = \angle TMC$, $KM = TM$, and $\angle MTC = \angle MK$
- By Theorem 1a, $\angle 1 + \angle MKA = 180°$
- By Theorem 1a, $\angle MTC + \angle MTB = 180°$
- By def. congruence, $\angle MTC = \angle 1$
- By algebra, $\angle MKA = \angle MTB$
- By Theorem 1b, $\angle KMA = \angle TMB$
- By BF3, $\triangle KMA \cong \triangle TMB$, because $\angle KMA = \angle TMB$, $TM = KM$, and $\angle MKA = \angle MTB$
- By def. congruence, $KA = TB$, and $KD = TC$ (proved earlier)
- By BF6, $AD = AK + KD$
- By BF6, $BC = BT + CT$
- By congruence, $BC = AD$ because $BT = AK$ and $CT = DK$.

QED.