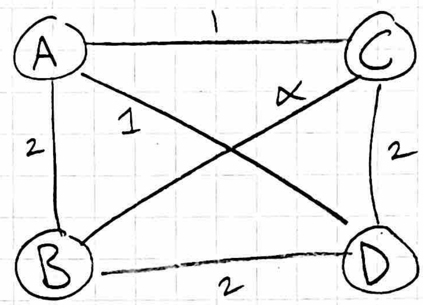
Homework 3 Part 1

A) Cost-to-go Current = Cost-to-go Next + Cost to travel to next

Cost-to-go = C



$\boxed{C_{ABCDA}=0}$ $\boxed{C_{ABDCA}=0}$ $\boxed{C_{ACBDA}=0}$ $\boxed{C_{ACDBA}=0}$ $\boxed{C_{ADBCA}=0}$ $\boxed{C_{ADCBA}=0}$

$C_{ABCD}=C_{ABCD}+D\to A$ $C_{ABDC}=C_{ABDCA}+C\to A$ $C_{ACBD}=C_{ACBDA}+D\to A$ $C_{ACDB}=C_{ACDBA}+B\to A$ $C_{ADBC}=C_{ADBCA}+C\to A$ $C_{ADCB}=C_{ADCBA}+B\to A$

$C_{ABCD}=0+1$ $C_{ABDC}=0+1$ $C_{ACBD}=0+1$ $C_{ACDB}=0+2$ $C_{ADBC}=0+1$ $C_{ADCB}=0+2$

$\boxed{C_{ABCD}=1}$ $\boxed{C_{ABDC}=1}$ $\boxed{C_{ACBD}=1}$ $\boxed{C_{ACDB}=2}$ $\boxed{C_{ADBC}=1}$ $\boxed{C_{ADCB}=2}$

$C_{ABC}=C_{ABCD}+C\to D$ $C_{ABD}=C_{ABDC}+D\to C$ $C_{ACB}=C_{ACBD}+B\to D$ $C_{ACD}=C_{ACDB}+D\to B$ $C_{ADB}=C_{ADBC}+B\to C$ $C_{ADC}=C_{ADCB}+C\to B$

$C_{ABC}=1+2$ $C_{ABD}=1+2$ $C_{ACB}=1+2$ $C_{ACD}=2+2$ $\boxed{C_{ADB}=1+\alpha}$ $\boxed{C_{ADC}=2+\alpha}$

$\boxed{C_{ABC}=3}$ $\boxed{C_{ABD}=3}$ $\boxed{C_{ACB}=3}$ $\boxed{C_{ACD}=4}$ $C_{AD}=C_{ADB}+D\to B$ $C_{AD}=C_{ADC}+D\to C$

$C_{AB}=C_{ABC}+B\to C$ $C_{AB}=C_{ABD}+B\to D$ $C_{AC}=C_{ACB}+C\to B$ $C_{AC}=C_{ACD}+C\to D$ $C_{AD}=1+\alpha+2$ $C_{AD}=2+\alpha+2$

$\boxed{C_{AB}=3+\alpha}$ Min $C_{AB}=3+2$ $\boxed{C_{AC}=3+\alpha}$ Min $C_{AC}=4+2$ $\boxed{C_{AD}=3+\alpha}$ $\boxed{C_{AD}=4+\alpha}$

Min

$C_A=C_{AB}+A\to B$ $\boxed{C_{AB}=5}$ $C_A=C_{AC}+A\to C$ $\boxed{C_{AC}=6}$ $C_A=C_{AD}+A\to D$ $C_A=C_{AD}+A\to D$

$C_A=3+\alpha+2$ $C_A=C_{AB}+A\to B$ $C_A=3+\alpha+1$ $C_A=C_{AC}+A\to C$ $C_A=3+\alpha+1$ $C_A=4+\alpha+1$

$\boxed{C_A=5+\alpha}$ $C_A=5+2$ $\boxed{C_A=4+\alpha}$ $C_A=6+1$ $\boxed{C_A=4+\alpha}$ $\boxed{C_A=5+\alpha}$

$\boxed{C_A=7}$ $\boxed{C_A=7}$

$C_A=\text{Min}$

B) Given $C_A = 5+\alpha$, $C_A = 7$, $C_A = 4+\alpha$, $C_A = 7$, $C_A = 4+\alpha$, $C_A = 5+\alpha$ for each respective path.

If $\boxed{\alpha \text{ is } \leq 2}$, α is the optimal route.

This comes from either the ACBDA path or ADBCA path where the cost would be between 4 and 6 (if weight 0 is allowed), thus making it less than every other path that does not include α.