Lab 0

Part 1:

1) • Vicky gets eliminated b/c even if she wins all her remaining games, she will still have fewer wins than Prava.

   • Prava also gets eliminated because S & E have six matches left, and any distribution of these 6 pts between S & E's wins result in Prava not having enough wins.

         ex: if S wins all 6:

              S has 84 wins > P's 80 wins
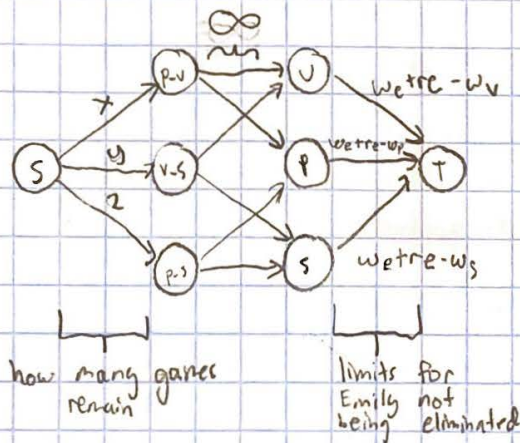
         if E wins all 6:

              E has 89 wins > P's 80 wins

         if S wins 3 & E wins 3

              S has 81 and E has 86 > P's 80 wins

   • This leaves Emily and Shashank b/c with the games remaining either could become the winner.

2)

w_e = Emily wins
r_e = Remaining games for Emily

w_i = i person's wins
r_i = i person's remaining games

x = remaining games between prava & vicky

y = # of games remaining with Vicky & Shashank

z = # of games remaining between Prava & Shashank

Strategy: We are limiting the capacities of the edges going into the sink node by calculating the limits of her victory. For example, if Vicky has a chance at eliminating Emily, then after maximizing the flow, there would have to be more games remaining that could result in Vicky victory. In this way, we know that Emily is eliminated if any of the x, y, z edges are not fully saturated.

2) continued

When solving the problem by finding maximum flow, the flow will be limited by the capacity equations on the (RHS) edges, if Emily is eliminated.

3) maximizing equation $X_{sp\_v} + X_{sv\_s} + X_{sp\_s}$
(or minimize $X_{vr} + X_{pr} + X_{sr}$)

s.t. $0 \leq X_{sp\_v} \leq 2$

$X_{sv\_s} = 0$

$X_{sp\_s} = 0$

$X_{sp\_v} = X_{p\_vp} + X_{p\_vv}$

$X_{sv\_s} = X_{v\_sv} + X_{v\_ss}$

$X_{sp\_s} = X_{p\_sp} + X_{p\_ss}$

$X_{vr} = X_{p\_vv} + X_{v\_sv}$

$X_{pr} = X_{p\_vp} + X_{p\_sp}$

$X_{sr} = X_{v\_ss} + X_{p\_ss}$

This formulation makes sense because the constraint equations represent the # of possible games that have left to be played. For example, $X_{sr} = X_{v\_ss} + X_{p\_ss}$ because the total number of victories s can have is equal to the number of wins against Vicky (X_{v_ss}) and against Prava (X_{p_ss}). The objective function represents maximization of possible wins between players in the games left to be played.