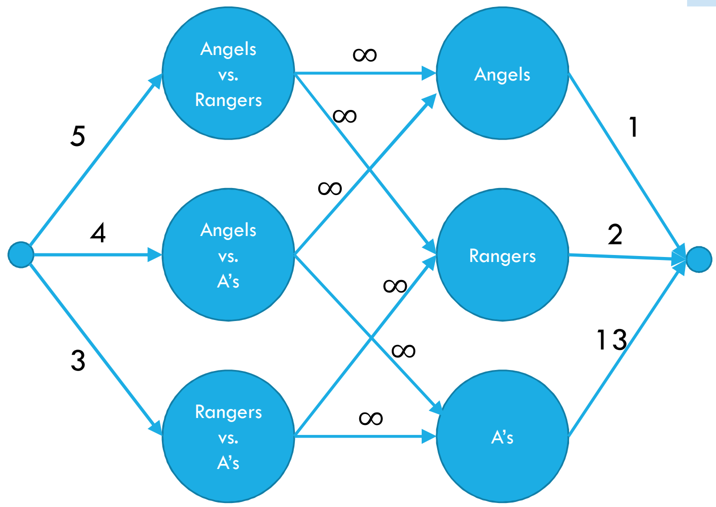
Making a Network

	Angels	Rangers	Mariners	A's
Angels	-	5	3	4
Rangers	5	-	4	3
Mariners	3	4	-	5
A's	4	3	5	-



Team	Wins (w)	Possible Wins (P)
Angels	81	93
Rangers	80	92
Mariners	70	82
A's	69	81

We're done!

Why are all the constraints met?

How many games are there to play? Equal to the capacities leaving s.

Why will the Mariners win with this assignment?

No "half-wins" or anything weird?

An Explanation Always Exists

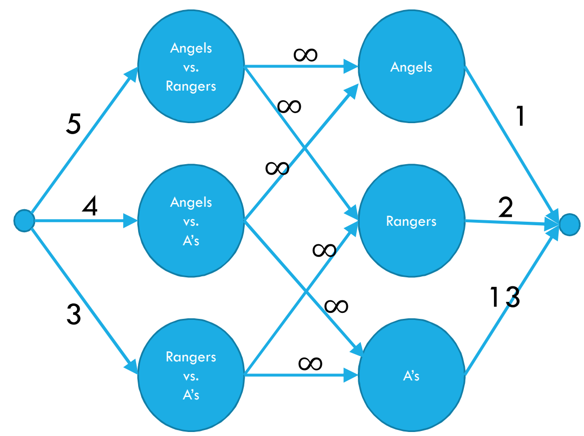
g_{ij} is games to be played between i and j
P is number of wins possible for Mariners
w_i is current number of wins for team i.

Let $(S, \bar{S})$ be a min-cut.
There's a lot of structure in the min-cut.
Let R be the set of teams whose vertices are reachable from s after the edges have been cut.

The capacity of the cut is
$\sum_{i \notin R \text{ or } j \notin R} g_{ij} + \sum_{i \in R} P - w_i$

And the capacity of the cut is less than $\sum_{i,j} g_{ij}$ (because that is a cut, and we can't have a flow of that value).

If R is a set of teams, let $a(R) = \frac{\sum_{i \in R} w_i + \sum_{i,j \in R} g_{i,j}}{|R|}$ the average number of games won be a team in R.



Another Problem

You run two coffee shops. You have to decide who will work at which of your shops today:

A, B, C are all capable of managing a shop.

D, E, F, G are all regular employees (can't be a manager)

You need at least one manager at each shop, at least 3 people (total) at shop 1 and at least 4 people (total) at shop 2.

Hint: think of assigning managers and non-managers as separate...