NayaOne

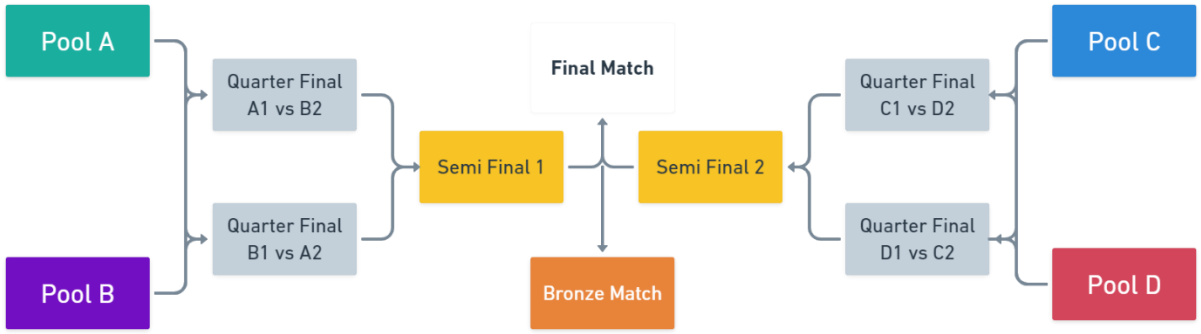
Internship preliminary question

The 2023 Men's Rugby World Cup has just ended, with South Africa crowned as champions. The tournament has 20 international teams, comprising of a pool stage, followed by quarter finals, semi-finals, a bronze medal match, and the final.

Pools A, B, C and D contain the following teams:

- Pool A = France, Italy, Namibia, New Zealand, Uruguay,
- Pool B = Ireland, Scotland, South Africa, Romania, Tonga,
- Pool C = Australia, Fiji, Georgia, Portugal, Wales, • Pool D = Argentina, Chile, England, Japan, Samoa.

- QF1 = Winner Pool C vs Runner-up Pool D,
- QF2 = Winner Pool A vs Runner-up Pool B, • QF3 = Winner Pool D vs Runner-up Pool C,
- QF4 = Winner Pool B vs Runner-up Pool A.



RWC draw diagram.

The top 10 teams in the World Rugby (WR) Men's Rankings, immediately before the RWC began, were as shown in Table 1.

WR Rank	Team
1	Ireland
2	South Africa
3	France
4	New Zealand
5	Scotland
6	Argentina
7	Fiji
8	England
9	Australia
10	Wales

Suppose that the probability of the final pool standings can be related to the WR rankings in Table 1 as follows:

- For simplicity, assume the probability of a team outside the WR top ten coming first or second in any pool is 0.
- For each pool, the probability of the final positions of the WR top ten teams maintaining the order relations is 0.6. For example, the probability of Pool C finishing with Fiji above Australia and Australia above Wales is 0.6.
- Within each pool, all other final permutations with non-zero probability have equal probability.

Question

Q} By treating each "{Team X} can {first/second} in Pool A/B/C/D" as a sample space event, calculate the probability that two of the quarter finals involved New Zealand playing against Ireland, and France playing against South Africa.

Format

Please submit your answer as a pdf.