

14. (b) and (c) could be records of a complete tournament since in each case B has won two games in succession. (a) cannot be since here A, B and C have each won one game.

Sequences in which tournament is still undecided after 5 games are as follows:

$ACBAC, BCABC$ so since each sequence has a probability of $\left(\frac{1}{2}\right)^5 = \frac{1}{32}$ probability that tournament is undecided after 5 games is $\frac{1}{16}$

A wins in fewer than 5 games with the sequences AA and $BCAA$ so probability = $\frac{1}{4} + \frac{1}{16} = \frac{5}{16}$

B wins in fewer than 5 games with the sequences $ACBB$ and BB so probability = $\frac{5}{16}$

C wins in fewer than 5 games with the sequences ACC and BCC so probability = $\frac{1}{8} + \frac{1}{8} = \frac{1}{4}$

A wins eventually with the sequences $AA, ACBAA, ACBACBAA$ etc or $BCAA, BCABCAA$ etc

so probability = $\left[\left(\frac{1}{2}\right)^2 + \left(\frac{1}{2}\right)^5 + \left(\frac{1}{2}\right)^8 + \dots\right] + \left[\left(\frac{1}{2}\right)^4 + \left(\frac{1}{2}\right)^7 + \dots\right] = \frac{\left(\frac{1}{2}\right)^2}{1 - \left(\frac{1}{2}\right)^3} + \frac{\left(\frac{1}{2}\right)^4}{1 - \left(\frac{1}{2}\right)^3} = \frac{\frac{5}{16}}{\frac{7}{8}} = \frac{5}{14}$

B wins eventually with sequences $BB, BCABB$, etc or $ACBB, ACBACBB$ etc so probability = $\frac{5}{14}$

C wins eventually with the sequences $ACC, ACBACC$ etc or $BCC, BCABCC$ etc

so probability = $2 \times \frac{\frac{1}{8}}{1 - \frac{1}{8}} = \frac{4}{14}$
