

- c. (5 points) What is the probability that a random ordering of the songs has two songs from artist A in a row or two songs from artist B in a row?

$$A = \{2 \text{ songs from Artist A in a row}\}$$

$$B = \{2 \text{ songs from Artist B in a row}\}$$

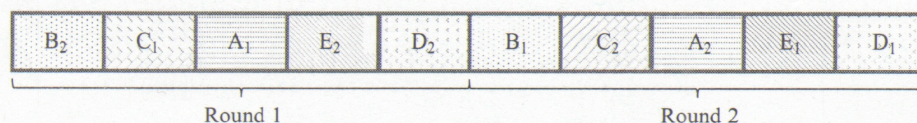
$$P(A \cup B) = P(A) + P(B) - P(AB)$$

$$= \frac{1}{5} + \frac{1}{5} - \frac{8!2!2!}{10!}$$

$$= \frac{2}{5} - \frac{4}{90} = \frac{16}{45}$$

- d. (4 points) Spotify tries an algorithm where they play the 10 songs in two rounds:
- In the first round, they play one song from each artist.
  - In the second round, they play the other song from each artist, preserving the **same artist ordering** as in the first round.

Here is an example of one ordering produced by the algorithm.  $A_2$  is the second song by artist A:



How many ways are there or ordering songs under this new algorithm?

Spotify uses a shuffling algorithm like the one in part (d) for the reason described in (b)

when the first round songs are selected, there are only one ordering available for the second round. We can decide the order for the 5 artist in the first round and there are 2 choices for each artist

ordering number for the new algorithm is

$$5! \cdot 2^5$$