```
In[17]:=  acesup[n_, S_, numiter_] := Module[{},
            (*n,S variables*)
            (*n is number of cards in a suit,can't use C or N as variable in Mathematica*)
            (*S is the number of suits*)
            (*for this problem only care about suits of cards,
            not numbers*)(*only care about the suit of the cards;
            creates a deck of S suits with n cards in each suit*)
            (*have suites 1, 10, 100, 1000 and so on so can easily tell if one of each*)
            deck = {};
            For[i = 1, i ≤ n, i++, (* this goes through each of the possible numbers *)
             For[s = 1, s ≤ S, s++, (* this goes through each possible suit *)
              deck = AppendTo[deck, 10^(s - 1)]]];

            maxsum = Sum[10^(s - 1), {s, 1, S}];
            (* this is the value of a hand of S cards, 1 in each suit *)
            (* only way to sum to 111...111 is if one of each suit! *)
            success = 0; (* initialize number of successes to 0 *)

            (* now the main loop, randomly checking s cards numiter times *)
            For[i = 1, i ≤ numiter, i++,
             {
              (* prints an update every time do 10% *)
              If[Mod[i, numiter / 10] == 0, Print["Have done ", 100.0 i / numiter, "%."]];
              hand = RandomSample[deck, S]; (* randomly chooses S cards from deck *)
              If[Sum[hand[[i]], {i, 1, S}] == maxsum, success = success + 1];
              (* if the hand has S different suits increase success by 1 *)
             }]; (* end of i loop *)

            Print["Observed Percent of time last ",
             S, " same suit is ", 100.0 success / numiter, "%."];
            Print["Theoretical Percent of time last ", S, " same suit is ",
             100.0 n^S / Binomial[S n, S], "%."];
           ]; (* end of module *)
          Timing[acesup[13, 4, 10 000 000]]
```

Have done 10.%.

Have done 20.%.

Have done 30.%.

Have done 40.%.

Have done 50.%.

Have done 60.%.

Have done 70.%.

Have done 80.%.

Have done 90.%.

Have done 100.%.

Observed Percent of time last 4 same suit is 10.561%.

Theoretical Percent of time last 4 same suit is 10.5498%.

Out[17]= {66.3472, Null}

In[18]:= **Timing[acesup[13, 4, 1 000 000 000]]**

Have done 10.%.

Have done 20.%.

Have done 30.%.

Have done 40.%.

Have done 50.%.

Have done 60.%.

Have done 70.%.

Have done 80.%.

Have done 90.%.

Have done 100.%.

Observed Percent of time last 4 same suit is 10.5501%.

Theoretical Percent of time last 4 same suit is 10.5498%.

Out[18]= {6771.16, Null}