Aces Up

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```
acesup[numiter_] := Module[{},
  (* computes the probability last
   four cards are in different suits *)
  theory = (52 / 52) (39 / 51) (26 / 50)
    (13 / 49) * 1.0; (* theoretical answer *)
  success = 0; (* prob have four
   final cards in four suits *)
  deck = {}; (* initializes deck to empty,
  adds then 13 1's, 13 10's,
  13 100's, 13 1000 *)
  (* last four cards are different suits
   if sum to 1111, else have a repeat *)
  For[j = 0, j ≤ 3, j++,
   For[i = 1, i ≤ 13,
     i++, AppendTo[deck, 10^j]];
  ]; (* end of j loop *)
  For[n = 1, n ≤ numiter,
   n++, (* this is the main loop *)
   {
    (* prints out every 10%
     so can see how you far we are *)
    (* printing slows down the program, but
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     only significantly if numiter is small *)
    If[Mod[n, numiter / 10] == 0,
     Print["We have done ",
      n * 100.0 / numiter, "%."]];
    temp = RandomSample[deck, 4];
    (* chooses the last four cards *)
    value  = Sum[temp[[k]], {k, 1, 4}];
    (* calculates sum of last four cards *)
    If[value == 1111, success = success + 1];
    (* if sum is 1111,
    increase success by 1 *)
   }]; (* end of the n loop *)
  Print["Theory: ", theory * 100, "%."];
  (* print results *)
  Print["Observed: ",
   success * 100.0 / numiter, "%."];
 ]
Timing[acesup[1 000 000]]
```

```
We have done 10.%.
We have done 20.%.
We have done 30.%.
We have done 40.%.
We have done 50.%.
We have done 60.%.
We have done 70.%.
We have done 80.%.
We have done 90.%.
We have done 100.%.
Theory: 10.5498%.
```

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Observed: 10.5366%.

Out[37]= {8.04688, Null}

In[32]:= Timing[acesup[10 000 000]]

Theory: 10.5498%.

Observed: 10.5319%.

Out[32]= {76.4063, Null}

In[34]:= Timing[acesup[100 000 000]]

Theory: 10.5498%.

Observed: 10.5542%.

Out[34]= {770.281, Null}
```