Stopping on Red

This game has a dealer $D$ and a player $P$. The dealer shuffles a standard deck of 52 cards. $D$ begins to flip the cards over one at a time. At any point $P$ can say “stop”, at which point the NEXT card the dealer turns over is $P$’s chosen card. $P$’s goal is to get a red card. (If $P$ never says “stop”, his card is the last one.)

Is it possible for $P$ to get a red card with probability better than .5? If so, what is his strategy? If not, prove it.

An interesting iteration

Let $u$ and $v$ be integer valued variables. $v$ is fixed and $u$ starts at 0. Analyze what happens when the following assignment (in C notation) is iterated:

$$u = (u-v) \& v$$

Describe the behavior in simple terms as a function of $v$.

Dice and Coins (hard)

We say that a $n$-die can be simulated with $k$ coins if the following holds:

Given an integer $n$, there is a vector of $k$ probabilities $(p_1, p_2, \ldots, p_k)$. and a finite procedure that flips these coins and from their outcomes produces one of $n$ equally probable results.

The question is: for what values of $n$ and $k$ can an $n$-die be simulated by $k$ coins? Does allowing irrational valued probabilities in the coins help? This problem is fairly open-ended. Start out by trying to solve it for small values of $n$. 