

**[nex40] Random walk in Las Vegas: chance and necessity**

A gambler with \$1 in his pocket starts playing a game against a casino with infinite monetary resources. In each round of the game, the gambler wins \$1 (with probability  $p$ ) or loses \$1 (with probability  $1 - p$ ). The game ends when the gambler is bankrupt.

- (a) Express the probability  $P_C$  that the gambler goes bankrupt eventually as a function of  $p$ .
- (b) Plot  $P_C$  versus  $p$  for  $0 < p < 1$ .
- (c) For what value of  $p$  is it a fair game in the sense that the gambler has a 50% chance of staying in the game forever?

**Solution:**