

GSOE9210 Engineering Decisions

Problem Set BU

1. A casino has two tables, A and B, each with four aces, $\clubsuit, \spadesuit, \heartsuit, \diamondsuit$, facing down.

On table A the *ante* (the amount it costs to play) is \$100. A player wins \$170 (the ante plus \$70) for choosing a red suit—hearts (\heartsuit) or diamonds (\diamondsuit)—and loses upon choosing a back suit— \clubsuit, \spadesuit .

Table B also has four aces facing down, but its ante is \$30. This time the *house* (the casino) reveals the first card, after which the player has the option to *fold* (stop playing, losing the ante) or play-on to reveal another card for an additional *raise* of \$60. Continuing and subsequently revealing a red card wins \$150 (the combined ante plus \$60), otherwise the player loses the both the ante and raised amounts.

- (a) Draw the lottery tree for the game at table A.
- (b) What is the expected value of table A?
- (c) A casino patron plays table B. The house reveals \clubsuit , and the player chooses to raise and play-on. Draw the resulting lottery tree (ℓ_{\clubsuit}) for this stage of the game.
- (d) What would be the probability of picking a black card if a black card was revealed by the house?
- (e) What would be the probability of picking a red card if a black card was revealed by the house?
- (f) What would be the expected value of raising and playing-on if a black card was revealed by the house?
- (g) Given a choice between playing-on or folding above, which would be better?
- (h) What would be the expected value of playing-on if a red card was revealed by the house?
- (i) If a red card was revealed should you play-on or fold?
- (j) What policy would you use if you played table B?
- (k) What would be the expected value of table B before any cards are revealed?
- (l) What would be the optimal policy upon entering the casino intending to play?
- (m) If you had the choice not to play at all, would you play table B, table A, or neither?
- (n) Write out the decision table corresponding to this decision problem.