

**HOMEWORK # 4 (for due date see web page)**

Consider the following game-frame. There are two players, Ann and Brad. Ann has \$4 in her purse (her entire wealth), while Brad has \$8 (his entire wealth). They are both given a red card and a black card. Each player selects one of the two cards and puts it face down on the table, while hiding the other card from the other player. The two cards are then turned. If they are the same color, each player keeps his/her money. If one is black and the other is red then a die is rolled. If it comes up 1 or 2, Brad gives his \$8 to Ann, otherwise (that is, if it comes up 3, 4, 5 or 6) Ann gives her \$4 to Brad. Each player cares only about his/her own wealth and prefers higher wealth to lower wealth.

- (a) Represent this as a strategic-form game-frame writing inside each cell of the matrix the corresponding outcome (thus no payoffs for the moment).
- (b) Define a **match** to be the outcome associated with the case where the color of the two turned cards is the same and **mismatch** the outcome associated with the case where the two turned cards are of different colors. Assuming that Ann is risk-averse and Brad is risk-loving, how do they rank match versus mismatch? Explain your answer.
- (c) Let  $x$  denote money. Assume that Ann has the following von Neumann-Morgenstern utility-of-wealth function:  $U(x) = 4x - \frac{x^2}{16}$ , while Brad has the following von Neumann-Morgenstern utility-of-wealth function:  $V(x) = x^2$ . Rewrite the strategic form of part (a) but this time with payoffs.
- (d) Find all the pure- and mixed-strategy Nash equilibria and calculate the players' expected payoffs at the Nash equilibria.