Economics 147: Bargaining Theory and Applications

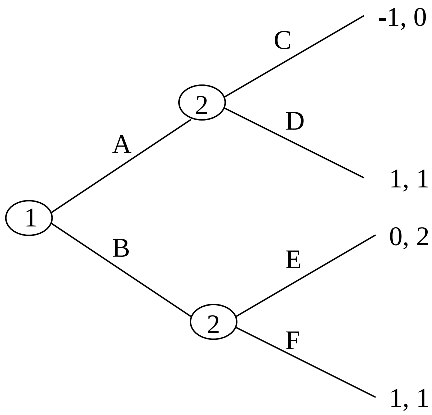
Spring 2004

Final (May 9th)

Name: ______________________________

You have 2 hours. 25 points per question. Good luck!!

1. Consider the following game:



a. Find the normal form of the game.

b. Find all the pure strategy Nash equilibria.

c. Find all the pure strategy subgame perfect Nash equilibria.

Name: ______________________________

2. True or false and multiple choice questions:

i. A Nash equilibrium outcome is always efficient.

True

False

ii. In a second price private value auction it is an equilibrium to bid:

a) more than your true value.

b) less than your true value.

c) exactly your true value.

d) all of the above.

iii. Which of the following axioms was not used by Nash to obtain his bargaining solution:

a) Independence of Irrelevant Alternatives.

b) Symmetry.

c) Pareto Optimality.

d) Invariance to Equivalent Payoff Representation.

e) Linearity.

iv. In the basic Rubinstein bargaining model with discount factor δ the first player has an advantage.

True

False

v. In most of the Rubinstein models we saw in class, the solution coincided with the solution to a Asymmetric Nash bargaining problem. The exception was in the model with:

a) Inside options.

b) Risk of break down.

c) Outside options.

d) None of the above.

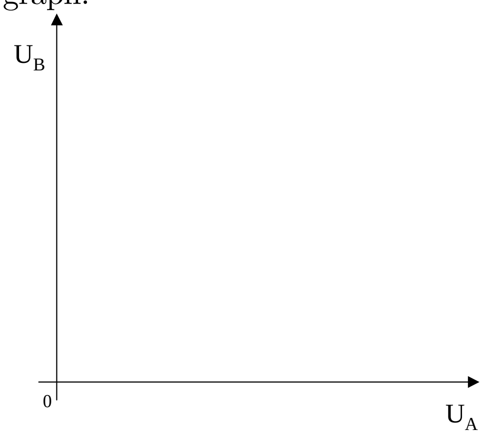
Name: ______________________________

3. Risk aversion and bargaining power:

Player A and B are bargaining on how to split a dollar. Their utility functions are $U_A = x_A^\alpha$ with $\alpha \in (0, 1]$ and $U_B = x_B$, where x_A and x_B are their shares of the dollar. If they do not agree both get zero.

a. Find the set of possible agreement utilities (Ω). (Write U_B as a function of U_A)

b. Draw Ω (for $\alpha = \frac{1}{2}$ and $\alpha = 1$) and the disagreement payoff d in the following graph.



c. Find the Nash bargaining solution utilities (U_A^{NBS}, U_B^{NBS}).

d. Find the Nash bargaining solution division of the dollar (x_A^{NBS}, x_B^{NBS}).

e. How does the division of the dollar change if player A becomes more risk averse?

Name: ______________________________

4. Bargaining with nay sayers:

Consider a Rubinstein infinite alternating offers model with discount factor δ and a pie of size 1. Player A gets to make the first offer. Players A and B both enjoy rejecting offers. Every time player A says NO, she gets an utility of a. Every time player B says NO, he gets an utility of b. Assume that $1 > \frac{a}{1-\delta} + \frac{b}{1-\delta}$.

a. Show that the sum of utilities is greater if they reach an agreement in period 1 than if they stay saying No to each other for ever.

b. Players A and B follow these strategies:

$$s_A = \begin{cases} \text{always offer } x_A^* \\ \text{always accept } x_B \leq x_B^* \\ \text{reject otherwise} \end{cases} \qquad s_B = \begin{cases} \text{always offer } x_B^* \\ \text{always accept } x_A \leq x_A^* \\ \text{reject otherwise} \end{cases}$$

. Find x_A^* and x_B^*.

c. How does x_A^* change if a increases? Provide intuition.

d. How much pie will player B get in equilibrium?

e. Find the value of τ that makes x_A^* coincide with the share that player A would get from an asymmetric Nash bargaining solution with $d = \left(\frac{a}{1-\delta}, \frac{b}{1-\delta}\right)$ and parameter of asymmetry τ. (Hint: rearrange the result from point b. to look like the solution from an ANBS)

Scratch paper: