Final: ECON 341

Due Friday, May 12th at noon. No late submissions will be accepted.

Section 1: In this section, you will be asked to analyze the models given. Each question is worth 50 points. Answer all parts of each question below. Express answers clearly and completely. Show work to receive partial credit. Where explanation is required, provide it!

1. Bayside High School is having a Sadie Hawkins dance. Kelli, Jessie, and Lisa each have the opportunity to ask one guy to the dance, and have preferences over the guys at school. The guys, Zack, Slater, and Screech, each have preferences as well. The preferences are given in Table 1, ranked from best (at the top) to worst.

Girls			Guys		
Kelli	Jessie	Lisa	Zack	Slater	Screech
Zack	Zack	Slater	Kelli	Jessie	Lisa
Slater	Slater	Zack	Jessie	Kelli	Jessie
Screech	Screech		Lisa	Lisa	Kelli

Table 1: Preferences

a.) Is the matching m(Zack) = Jessie, m(Slater) = Lisa, m(Screech) = Kelli stable? If yes, prove it. If not, find a deviating pair.

b.) Is the matching m(Zack) = Kelli, m(Slater) = Jessie, m(Screech) = Lisa stable? If yes, prove it. If not, find a deviating pair.

c.) Use the deferred acceptance procedure with girls making the offers (this is a Sadie Hawkins dance, after all!) to find a stable matching.

Now, a new girl, Tori, comes to Bayside. Since they all want to go to the dance, the four girls now consider asking a fourth guy, Maxwell Nerdstrom, to the dance. The new preferences are given in Table 2.

Girls				Guys			
Kelli	Jessie	Lisa	Tori	Zack	Slater	Screech	Maxwell
Zack	Zack	Slater	Zack	Kelli	Jessie	Lisa	Jessie
Slater	Slater	Zack	Slater	Tori	Tori	Tori	Tori
Screech	Screech	Maxwell	Screech	Jessie	Kelli		Lisa
Maxwell		Screech	Maxwell	Lisa	Lisa		Kelli

Table 2: Preferences after Tori arrives, including Maxwell.

d.) How does the matching for the Sadie Hawkins dance produced from the deferred acceptance procedure change from part c.?

e.) Does Screech have a strategic incentive to misrepresent his preferences? What if Screech states that he is *only willing to go to the dance with Lisa*? Support your answer using the matching produced in part d..

2. Consider an incomplete information game between a doctor (P1) and a patient (P2). The patient has the option to take a test to determine a potential medical condition, but the doctor has private information as to the benefit of the test. In particular, the test is *beneficial* with probability $\frac{1}{3}$, but the test is *not beneficial* with probability $\frac{2}{3}$. Once the doctor finds out the test is (or isn't) beneficial, she can recommend (R) or not recommend (Not) the test to the patient. The patient sees the recommendation, but does not know the actual benefit of the test; the patient must then decide to either take the test (T) or not take (NT). The interaction is captured in the tree below (information sets denoted w/ dashed lines):
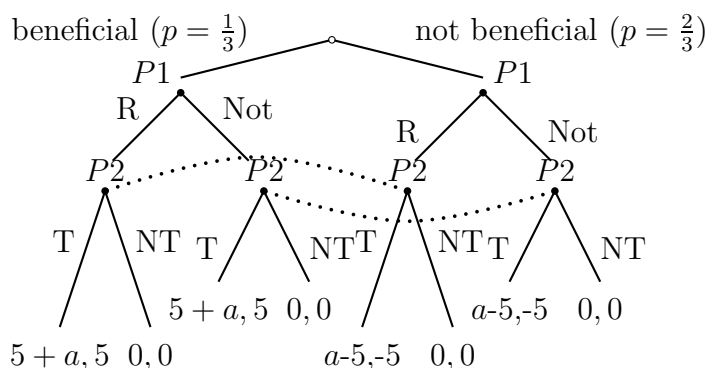
a.) (10 points) Describe (in words) the difference between signaling and cheap talk. When she gives her recommendation, is the doctor engaging in cheap talk or signaling?

b.) (10 points) Parameter a captures the benefit (or payment) the doctor receives from the patient taking the test - *regardless of the benefit to the patient*. Describe (in words) the potential role of a in the effectiveness of the doctor's communication.

c.) (15 points) Consider the following scenario: (1) the doctor always recommends the test; (2) the patient always ignores the doctor; (3) the patient believes the test is beneficial with probability $\frac{1}{3}$, regardless of what the doctor says. Is this scenario a **babbling equilibrium**? Keep in mind you must check that (1) and (2) are best responses, and that (3) is indeed true.

d.) (15 points) Consider the following scenario: (1) the doctor only recommends the test when beneficial; (2) the patient always follows the doctor's recommendation; (3) the patient believes the test is beneficial with probability 1, when it is recommended, and not beneficial with probability 1 when it is not recommended. Is this scenario a **cheap talk equilibrium**? Keep in mind you must check that (1) and (2) are best responses, and that (3) is indeed true.

3. Robin is hanging out at MacLaren's bar. She glances at her watch, and realizes it's getting late. Robin would like to take someone home, but she worries that at this hour, the only guys left at the bar are losers not worth her time. Ted is still at the bar, and he isn't a loser. However, Robin's problem is one of *adverse selection* - how can she distinguish, at this late hour, between the good guys (like Ted) and the losers? *How can Robin and Ted solve this problem of adverse selection?*

   Objective: Build a model (or models) which can address the italicized question.

   How can Robin and Ted solve this problem of adverse selection?

   Your model(s) should tell a story. As with any good model, it should be well-motivated by the phenomenon you are attempting to describe, provide a precise analytical framework, and give a prediction of decision makers' behavior in the context of the model. Your submission should include:

   a.) (10 points) an answer to the question in words, which includes a description of what you will address in your model;

   b.) (20 points) a model or set of models you will use to address the point in question - the model should include incomplete information in some way, as well as a proposal for solving the adverse selection problem;

   c.) (20 points) a solution to the model which gives a prediction of both decision makers' optimal choices.

4. The economics department has students who will be seniors next year. Each of the students must take a thesis course, in the fall semester, from one of three faculty members: Mark, Bryce, and Kara. Each student has a ranking of which professor they'd prefer to work with; likewise, each professor has a ranking of the students they'd prefer to have enrolled in their thesis course. No professor can take on more than $\frac{1}{3}$ of the total number of students in his or her course. Moreover, since students work on theses independently, professors' rankings depend only on their preference over each individual student, and not on any "group effects."* *Help the department devise a way to enroll (match) the students to thesis courses.*

Objective: Build a model (or models) which can address the italicized statement.

Help the department devise a way to enroll (match) the students to thesis courses.

Your model(s) should tell a story. As with any good model, it should be well-motivated by the phenomenon you are attempting to describe, provide a precise analytical framework, and give a prediction of decision makers' behavior in the context of the model. Your submission should include:

a.) (10 points) an answer to the question in words, which includes a description of what you will address in your model;

b.) (15 points) a model or set of models you will use to address the point in question;

c.) (15 points) a solution to the model and support for why your proposed solution is reasonable;

d.) (10 points) an answer to the follow-up question: "How would your model and prediction change if the professor *did consider group effects of their thesis enrollments*?"

*By "group effects," I mean additional benefits or costs provided to the professor from having any particular pairs or threesomes in their course. Benefits could include positive spillovers as students provide constructive feedback to each other; costs could include counterproductive or distracting in-class conversations.