Name:

Section:

Date assigned: Thursday, 10/22Date due: Tuesday, 10/27

## Instructions:

- This problem set has 3 questions, for a total of 35 points. The number of points for each question is indicated at the start of the question.
- Please solve the questions on separate pieces of paper that are to be turned in with your name written on top, **stapled**.

## 1: (15 points total)

The town of Davidson has three families, each with one child, and each of which earns \$20,000 per year (pre-tax). Each family is taxed \$4,000 per year to finance the public school system in the town, which any family can then freely attend. Education spending is \$6,000 per student in the public schools. The three families differ in their preferences for education. Though families A and B both send their children to the public school, family B places a greater value on education than family A. Family C places the greatest relative value on education and sends its child to private school.

- (a) Graph the budget constraints facing each of the three families and draw a possible indifference curve which could correspond to the choice each family makes. The town is considering replacing its current system with a voucher system. Under the new system, each family would receive a \$6,000 voucher for education, and families would still be able to send their children to the same public school. Since this would be more costly than the current system, they would also raise taxes to \$6,000 per household to pay for it. (6 points)
- (b) Draw the budget constraint the families would face under this system. Suppose that when the new system is introduced, family A continues to send their child to public school, but family B now sends their child to private school (along with family C's child). (2 points)
- (c) Explain how you know that family C is made better off and family A is made worse off by the voucher policy. (3 points)
- (d) Show, using diagrams, that family B could be made better or worse off by the voucher policy. (4 points)

## 2: (16 points total)

Davidson has two equally sized groups of people: smokers and nonsmokers. Both types of people have utility  $U = \log(C)$ , where C is the amount of consumption that people have in any period. So long as they are healthy, individuals will consume their entire income of \$15,000. If they need medical attention (and have no insurance), they will have to spend \$10,000 to get healthy again, leaving them with only \$5,000 to consume. Smokers have a 12% chance of requiring major medical attention, while non- smokers have a 2% chance. Insurance companies in Davidson can sell two types of policy. The "low deductible" (L) policy covers all medical costs above \$3,000, while the "high deductible" (H) policy only covers medical costs above \$8,000.

- (a) What is the actuarially fair premium for each type of policy and for each group?(4 points)
- (b) If insurance companies can tell who is a smoker and who is a nonsmoker and charge the actuarially fair premiums for each policy and group, show that both groups will purchase the L policy. (4 points)

Suppose that smoking status represents *asymmetric information*: each individual knows whether or not they are a smoker, but the insurance company does not.

- (c) Explain why it is impossible, at any price, for both groups to purchase L policies in this setting. Which groups, if any, do you expect to buy L policies, and at what price? (4 points)
- (c) Show that it is possible for both groups to purchase insurance, with one group buying L policies and one group buying H policies. (4 points)

## 3: (4 points total)

One way to restructure a student loan repayment plan is to make it income-contingent—that is, to relate the amount that a student would have to repay in any given month to how much income he or she earns. How might the existence of such a plan alter a student's choice of college major?