Recitation 6
Intermediate Micro

1. Amelia has a car valued at \$90,000. Unfortunately there is a chance that there will be an accident and that her car will suffer \$67,500 in damages. Thus leaving her a car valued at only \$22,500. The probability of the accident is .2. Finally assume that her preferences over dollar values of her car can be represented by the utility function $u(x) = \sqrt{x}$.

a) What is her expected wealth? What is Amelia's expected utility? What is the certainty equivalent to her situation? What is the risk premium associated with her situation? What is the maximum that Amelia would be willing to pay for a full insurance policy?

b) Illustrate her expected utility, expected wealth, certainty equivalent, the risk premium and her maximum willingness to pay for a full insurance policy.

c) Write her wealth in each of the 2 states if she purchases $\$C$ of coverage. Write her expected utility if she purchases $\$C$ of coverage. Write the first order conditions that define the coverage C that maximizes her expected utility.

d) What is the price of fair insurance for Amelia? If insurance is priced fairly then use your first order conditions to find how much insurance Amelia will buy.

Insurance companies rarely offer full insurance policies. The typical policy includes a deductible. If an accident occurs then the policy holder must pay damages up to the deductible amount and the policy pays the remaining damages.

Suppose that the insurance company offers only one policy and that it includes a \$2500 deductible. So if an accident occurs then Amelia will only receive \$65000. The price of this policy is P (this is the cost of the entire policy and not the price per dollar of coverage).

e) If this insurance policy is priced fairly then what will be the price P? Will Amelia buy the policy? Illustrate in a new diagram below the policy with the \$2500 deductible. In your diagram include her expected utility without insurance and the expected value of her car.

2. The Decision Tree Planting Company, Inc is an international corporation that plants trees. Decision Tree plants two types of trees: larches and sycamores. Since consumers like having trees planted, not just seeds, Decision Tree needs to pregrow the trees before they are ready for consumption. Each tree takes exactly 5 years to mature to an appropriate level for sale. Thus Decision Tree must decide whether to plant sycamores or larches 5 years in advance. Each year in the London office, Decision Tree plants 1,000 trees. Demand for trees is proportional to the makeup of the UK Parliament and totals 1,000 trees. Only the Conservative Party and the Labour Party care about trees. Furthermore, the Conservative Party only likes sycamores and the Labour Party only likes larches. The way the UK Parliament works means that trees are planted by ratio of Conservative Party members in Parliament to Labour Party members. Seed for trees is easily harvested and all other costs are fixed, so all it takes to maximize profit is the revenue from trees. Decision Tree must decide between producing $\frac{3}{5}$ sycamore trees or $\frac{1}{5}$ sycamore trees. In five years, Decision

Tree thinks there is a 40% chance Parliament will have a ratio of 3 : 2 Conservative to Labour and a 60% chance there will be another recession and the Labour Party will take over with a ratio of 1 : 4 Labour to Conservative members. Demand is based on this ratio and extra trees not demanded are given to charity. If Decision Tree does not have enough trees to meet demand, it will sell all that it has. Decision Tree charges $1 per tree. Unsurprisingly, in this microeconomic world, there is no interest or inflation.

a) Illustrate Decision Tree Planting Company's problem in a decision tree.

b) What is the ex ante optimal number of sycamore trees Decision Tree will plant? Is it always ex post optimal? When isn't it?

Decision Tree Planting Company, Inc found out that big banks rig elections and know the outcome 5 years in advance. Decision Tree can buy the information from the banks.

c) What is Decision Tree's decision tree for buying the information?

d) What is the most Decision Tree will pay for the information?