## HOMEWORK 5 (for due date see the web page)

There are two types of individuals. They have identical initial wealth of $\$ 4,900$, they face a potential loss of $\$ 2,400$ and they have a utility-of-money function $U(m)=\sqrt{m}$. For individuals of type $H$ the probability of loss is $p_{H}=25 \%$ while for individuals of type $L$ the probability of loss is $p_{L}=10 \%$. Let $N_{H} \geq 1$ be the number of $H$ types and $N_{L} \geq 1$ the number of $L$ types. The insurance market is a monopoly. The monopolist knows all of the above data but cannot tell whether any particular customer is of type $H$ or type $L$. The monopolist is considering several options (refer to the following figure). Assume that (1) if indifferent between insuring and not insuring, a consumer would choose to insure and (2) if indifferent between two contracts, then the consumer would choose the one with lower deductible.

(a) Option 1: offer only contract $A$. Calculate the monopolist's profits in this case as a function of $N_{H}$ and $N_{L}$.
(b) Option 2: offer only contract $B$. Calculate the monopolist's profits in this case as a function of $N_{H}$ and $N_{L}$.
(c) Option 3: Offer contracts $C$ and $D$ and let consumer choose. The deductible for contract $C$ is $\$ 2,073.60$ and the premium for contract $D$ is $\$ 615$. Write an equation whose solution gives the premium of contract $D$ and verify that the solution is $h=42.83$. Calculate the monopolist's profits in this case as a function of $N_{H}$ and $N_{L}$.
(d) If $N_{H}=100$ and $N_{L}=1,000$, which of the three options would the monopolist prefer?
(e) If $N_{H}=50$ and $N_{L}=100$, which of the three options would the monopolist prefer?

