

SECOND MIDTERM EXAM
Econ 4011, Spring 2012

Do all questions. The questions have equal weight. You have 1hr and 23minutes.

1. Stackelberg Equilibrium

Maple and Bell are the leading producers of truffles. The market demand function for truffles is given by $p = 120 - x$. The number of truffles produced by Maple and Bell are denoted by x_M and x_B , respectively. Maple's cost function is $8x_M$ while Bell's cost function is $4x_B$. The two firms can choose any positive level of production.

- Write down the best response functions for both firms.
- What is the Stackelberg Equilibrium of this game if Maple is the leader?

2. Repeated Game Equilibria

Consider the following simultaneous move stage game which is repeated infinitely.

	C	D
C	40,30	0,40
D	50,10	10,20

The row player (Ann) and the column player (Bob) have a common discount factor δ .

- What is the static Nash Equilibrium of this game?
- Consider the "grim trigger" strategy of playing C in period 1; playing C as long as both players have always played C in the past, and playing D otherwise. For what values of the common discount factor, δ , do these strategies constitute a subgame perfect equilibrium?
- Write down a pair of strategies (one for each player) of the repeated game which form a subgame perfect equilibrium when $\delta = \frac{1}{10}$. You are being asked for *one* subgame perfect equilibrium, *not all*.

3. Bayes' Law

Forest fires are known to be caused by either human error, spontaneous combustion or other natural causes. Investigation following a forest fire has revealed evidence that has an 80% chance of being found if the fire was due to human error and a 40% chance of being found if the cause was spontaneous combustion. The chances of finding such evidence is 20% if the fire was caused by other natural causes. Suppose that 10% of all forest fires are due to human error, 50% due to spontaneous combustion with the remaining 40% being accounted for by other natural causes. Given the discovered evidence, how probable is it that the forest fire was due to human error?