Problem 1 (Exercise 8.3-8.5). There are 16000 individuals, all identical in terms of initial wealth $W_0 = \$4000$, potential loss $\ell = \$2500$, and have vNM utility-of-money function $U(m) = 10\ln(m/1000)$. 12000 individuals have a high probability of loss $p_H = 1/5$, and 4000 have a low probability of loss $p_L = 1/15$.

(a) A monopolist seller of insurance is considering offering one insurance contract designed in such a way that only the H-type will purchase it (aka "Option 1"). What will its expected total profits be?

(b) Show that, for a monopolist seller of insurance, offering one insurance contract that is attractive to both the L-type and the H-type (aka "Option 2") is not profitable.

(c) Reduce the number of high-risk individuals from 12000 to 6000, but keep 4000 low-risk individuals. Show that for a monopolist seller of insurance, Option 2 is in fact profitable.

(d) Following part (c), write two equations whose solution gives the contract that maximizes the monopolist's profits under Option 2. If you are able to, compute the solution and determine the monopolist's expected total profits if it offers that contract.

Problem 2 (Exercise 8.7d, 8.9a). There are 8000 individuals, all with the same initial wealth $W_0 = 10000$, facing the same potential loss $\ell = 6000$ and with the same vNM utility-of-money function $U(m) = \ln(m)$. Of these 8000 individuals, 1500 are high-risk with a probability of loss $p_H = 1/4$ while the remaining 6500 are low-risk with a probability of loss $p_L = 1/16$.

(a) Suppose that a monopolist insurance company offers a menu of two contracts, C_H targeted to the H-type and C_L targeted to the L-type (aka "Option 3"), such that one contract is a full-insurance contract with premium \$2,000. Write a pair of equations whose solution gives the other contract that the monopolist will offer. If you are able to, compute the solution and determine the monopolist's expected total profits if it offers that contract.

(b) Find the pair of contracts that is the only candidate for a free-entry perfectly competitive equilibrium.