HOMEWORK 5 (for due date see the web page)

There are two types of individuals, the U type (the number of these is n_u) and the V type (the number of these is n_v). They all have the same wealth of \$193,600 and face a potential loss of \$17,200. The probability of loss is $p_u = \frac{1}{10}$ for the U type and $p_v = \frac{1}{5}$ for the V type. The von Neumann-Morgenstern utility-of-money function of a U type is $U(m) = 100\sqrt{m}$ while the utility-of-money function of a V type is $V(m) = 100\ \ln(m)$. The insurance industry is a monopoly and the monopolist cannot tell the two types apart, that is, if a consumer applies for insurance, the monopolist is not able to tell whether the consumer is of type U or of type V.

(a) What is the maximum premium that a U type is willing to pay for full insurance?

(b) Suppose that the monopolist offers only a full-insurance contract with premium \$3,450. Calculate the monopolist's expected profits.

(c) Suppose now that the monopolist offers two contracts, the one described in part (b) and a contract with premium of \$225 and deductible of \$15,000. Calculate the monopolist's expected profits.

(d) Suppose that $n_v = 100$ and $n_u = 4,400$. Is the monopolist better off offering only the contract of part (b) or the two contracts of part (c)?

(e) Suppose that $n_v = 100$ and $n_u = 4,700$. Is the monopolist better off offering only the contract of part (b) or the two contracts of part (c)?

(f) Suppose now that $n_v = n_u = n$. Write the profit maximization problem for the monopolist if it pursues the strategy of offering two different insurance contracts, one targeted to the U type and the other targeted to the V type. [No need to solve or analyze it.]