Economics 103

PRACTICE EXAM for the THIRD MIDTERM

Note: a typical exam would consist of three questions. The extra questions are for additional practice.

1. Consider the market for second-hand laser printers. The quality of a laser printer is measured by the number of pages printed so far, denoted by μ (obviously, the lower μ, the higher the quality of the printer). The owner of a laser printer knows how many pages he has printed, while the buyer does not know. You want to buy a second-hand laser printer. It is customary for the buyer to put an ad in the newspaper with the price he is willing to pay. Sellers who are willing to sell at that price call the buyer. There is no bargaining. After he has received all the phone-calls, the buyer decides whether or not to buy and chooses one of the callers (at random, since their printers are indistinguishable from his point of view). You think that the owner of a printer of quality μ will be willing to sell only if he is offered at least $\$3000 - \frac{\mu}{4}$. You also think that μ has the following probability distribution:

Proportion of printers with $\mu = 1000$	Proportion of printers with $\mu = 2000$	Proportion of printers with $\mu = 3000$	Proportion of printers with $\mu = 4000$	Proportion of printers with $\mu = 5000$	Proportion of printers with $\mu = 6000$
$\frac{1}{12}$	$\frac{3}{12}$	$\frac{4}{12}$	$\frac{1}{12}$	$\frac{2}{12}$	$\frac{1}{12}$

You know that there are 240 owners of laser printers who are willing to sell (if offered the right price). Fill in the following table:

If you offer a price of	Number of phone-calls you will receive	Average quality of printers offered for sale to you
\$1000		
\$1800		
\$2100		
\$2600		
\$2750		

2. Paul owns a firm. His von Neumann-Morgenstern utility-of-money function is given by $U(\$y) = y$. Paul wants to hire Meg to run the firm for him. Meg's von Neumann-Morgenstern utility-of-money function is given by $V(\$w) = \sqrt{w}$. Let x denote the firm's profits and assume that x can only take one of the following values: 1, 2, 3, or 4. The probability distribution of x is given by:

profits	\$1	\$2	\$3	\$4
probability	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

Suppose that Meg's reservation utility (the utility she gets if she works for somebody else) is 1. Paul's utility if he runs the firm himself is 1. Describe a contract that is Pareto efficient and acceptable to both parties.

3. Peter owns a firm. His von Neumann-Morgenstern utility-of-money function is given by U($w) = $\sqrt{w}$. Peter wants to hire Andrea to run the firm for him. Andrea's von Neumann-Morgenstern utility-of-money function is given by V($y) = 3y+6. The firm's profits will be either $1,600 (with probability 25%) or $900 (with probability 75%).

(a) In an Edgeworth box shows the indifference curves of both Peter and Andrea.

They have agreed on the following contract, call it contract *S*: Andrea will get 40% of whatever profits the firm makes (and Peter will get the remaining 60%).

(b) Represent contract *S* as a point in an Edgeworth box and draw the indifference curves through it.

(c) Explain why the contract is not Pareto efficient.

(d) List three Pareto efficient contracts.

(e) In order to construct a contract which is Pareto superior to contract *S*, would you give Andrea more or less than $640 if the firm's profit turned out to be $1,600? Explain why.

4. The insurance industry is a monopoly. It operates in two different geographical areas: N and S. The monopolist is allowed to offer different contracts in different areas. All the potential customers have the same initial wealth of $1,600 and face the same potential loss of $444. The probability of loss varies across the different areas, due to the different weather conditions in them: it is $\frac{1}{3}$ in area N and $\frac{1}{6}$ in area S. All the potential customers have the same von Neumann-Morgenstern utility-of-money function: $U(\$x) = 10\sqrt{x}$. Assume that, if indifferent between buying insurance and not buying insurance each potential customer will buy insurance.

(a) What is the premium of the contract that the monopolist offers in area N?

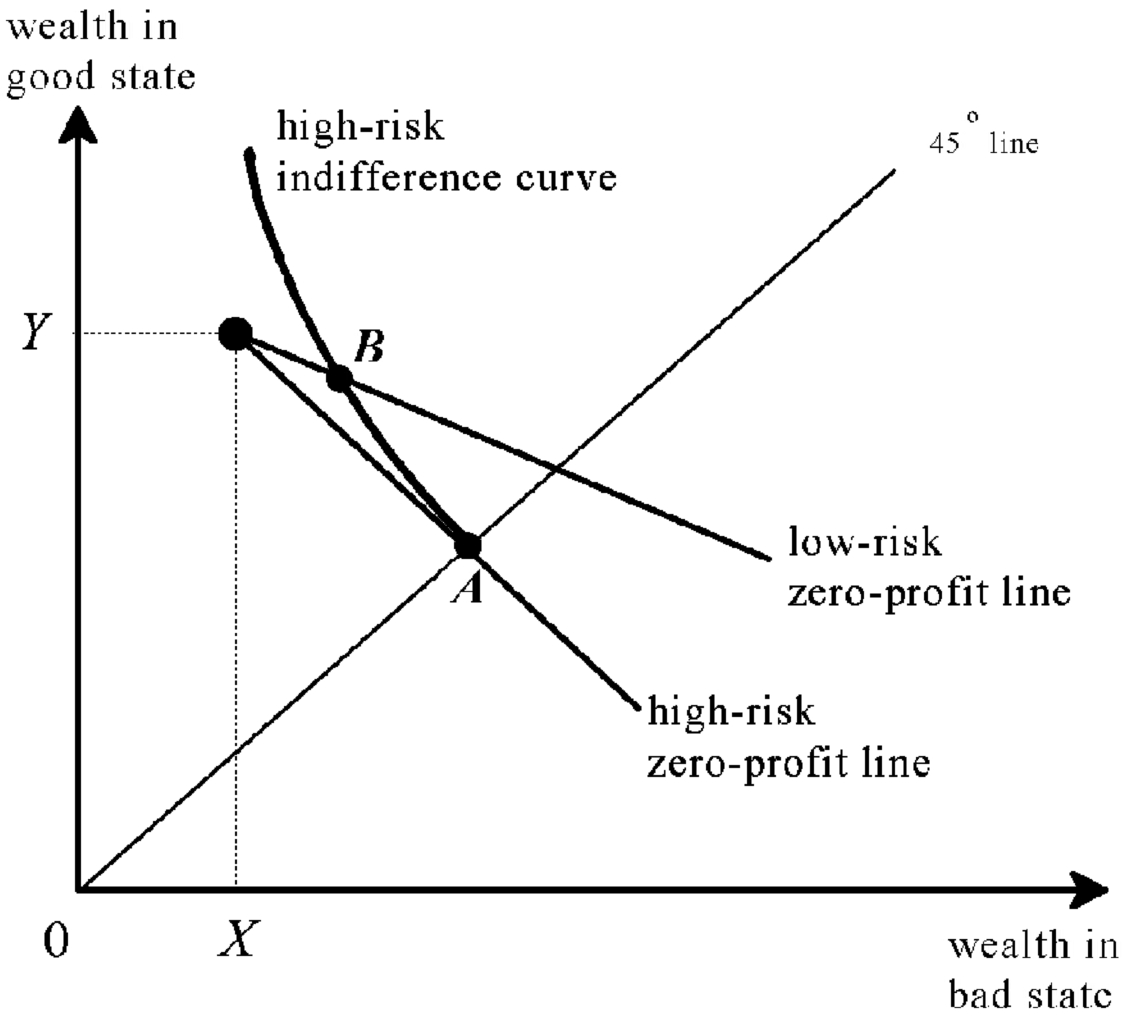
(b) What is the premium of the contract that the monopolist offers in area S?

Suppose now that the monopolist is required by law to offer the same contract in both areas. Suppose also that there are 70 potential customers in area N and 95 in area S.

(c) If the monopolist offers, in both areas, a contract with premium $120 and deductible $87, what is its total profit (that is, profit in area N + profit in area S)?

(d) If the monopolist offers, in both areas, a full-insurance contract with premium $153, what is its total profit?

5. There are two types of potential customers, one with probability of loss ¼ and the other with probability of loss $\frac{1}{10}$. In every other respect the two types are identical: they have the same initial wealth, face the same potential loss and have the same von Neumann-Morgenstern utility-of-money function given by $U(\$m) = \sqrt{m}$. Consider the contracts shown in the following graph (note: it is not drawn to scale), where the point (X,Y) is the no-insurance point.



Let X = 300 and Y = 828. Suppose that the premium of contract B is 9.8. What is the deductible of contract B?