All questions must be answered on this test form!
For each question you must show your work and (or) provide a clear argument.
Use the last two pages and the back of the form as scratch paper.

Question 1

(a) Insurance company A offers health insurance with the following features: The cost of the insurance per year is 3,000 Dollars. A person can choose to get treatment in any hospital of his/her choice. The insurance has a deductible of 1,000 Dollars. Suppose company B starts to offer the following policy. At a cost of 1,400 Dollars per year, the deductible is 3,000 Dollars, and patients have to choose a hospital on a list of preferred providers.

Answer the following question (to get credit your answer must be short and to the point — fit in the box).

1. Will anyone sign up for insurance B? If yes, what type of costumers?

2. How will profits of company A be affected when B enters the market.

(b) What fundamental informational problem can cause some countries with higher health care expenditures to have a lower quality of care?

(c) List two ways how to lower the impact of the problem in (b).
Question 2 Suppose that each person is characterized by the accident probability \( \alpha \in [0, 1] \). If the person’s Bernoulli utility function is \( \sqrt{x} \), and if the income is 400 Dollars and the accident causes a loss of 400 Dollars, then one can check that a person of type \( \alpha \) is willing to pay at most \( p = 800\alpha - 400\alpha^2 \) for insurance — if we write this equation as a function of \( p \) then we get \( \alpha = 1 - 0.05 \sqrt{400 - p} \). Clearly, the expected cost of providing insurance to a person of type \( \alpha \) is 400\( \alpha \). Finally, suppose that the types \( \alpha \) are uniformly distributed on \([0, 1]\), i.e., the fraction of types \([0, \bar{\alpha}]\) in the whole population \([0, 1]\) is exactly \( 1/\bar{\alpha} \).

(a) First, suppose that by law everyone must have insurance. Determine the insurance premium \( p \) at which the insurance company breaks even (i.e., makes zero profits).

(b) Now suppose that insurance is voluntary. Suppose the insurance company charges a rate of 300 Dollars. Then among people who get insurance

The insurance premium is

The average accident probability is

The insurance companies expected profit per customer is
Question 3 Suppose that a trader at an investment bank has the choice between three investment strategies. Investment 1 pays a return of 3% with probability 0.6 and 0% with probability 0.4. Investment 2 pays 20% with probability 0.8 and −5% with probability 0.2. Investment 3 has a payoff of 60% with probability 0.4 and −50% with probability 0.6. The trader must decide which of the following three investment strategies to use (in particular, for simplicity we assume that they cannot be combined). The trader has \( m \) Dollars to invest.

(a) Suppose that the trader’s payoff is in form of a bonus that is a fraction \( \alpha \) of trading profits (i.e., if the investment’s return is 0 or negative, then the trader receive zero payments). Then the trader’s expected bonus when choosing investment 1 is \[ \text{from investment } 2 \text{ is } \], from investment 3 is \[ \text{Therefore the trader will chose investment} \]

(b) Now suppose that the trader receives a salary of 100,000 Dollars. However, if his trading results in a negative return his salary is reduced by a penalty of \( \beta \) times the amount of money lost. Then the trader’s expected payoff when choosing investment 1 is \[ \text{from investment } 2 \text{ is } \], from investment 3 is \[ \text{Therefore the trader will chose investment} \]

(c) Now suppose the trader receives a bonus of $1 Million if he has the highest trading return among all traders in the firm. He believes that highest return of other traders in the company are: 80% with probability 0.2, 50% with probability 0.5, and 15% with probability 0.3. Suppose the trader’s own returns from investments 1 to 3 are stochastically independent of the other traders’ returns. Then the trader’s expected bonus when choosing investment 1 is \[ \text{from investment } 2 \text{ is } \], from investment 3 is \[ \text{Therefore the trader will chose investment} \]
Question 4  Suppose that all firms in an industry have cost function \( C(Q) = 5Q^2 \).
   There are 100 such firms. Demand is given by \( Q_D(P) = 2,000 - 40P \). Then in equilibrium,

\[
P = \boxed{\text{[blank]}} , \text{ and } Q = \boxed{\text{[blank]}} \]

10 points
Question 5 A firm’s cost function is given by \( C(Q) = 100,000 + 20Q \). Suppose there are 1,000 costumers, each of them has a demand function \( Q_D(P) = 100 - 2P \). The firm wants to do two-part pricing, i.e., charge a fixed fee \( F \) and a price per unit \( P \). 12 points

The profit maximizing \( F = \), \( P = \)

The firm’s total profit (from all costumers) is
**Question 6** Suppose a firm has two types of customers. Each type A customer has a demand function $Q_A^D(P) = 20 - P$, while each type B customer’s demand function is $Q_B^D(P) = 18 - 2P$. The firm’s marginal costs are zero.

Suppose the firm currently sells the good at a price of 6 Dollars per unit, but would like to offer a quantity discount to type A customer, i.e., a quantity $Q$ and a price $F$ that allows type A customers to consume $Q$ units at a total cost of $F$ Dollars. Since the type is private information, the firm must choose $Q$ and $F$ such that type A customers are better off with the $(Q, F)$ contract (than with paying 6 Dollars per unit). Also, the firm wants to choose $(Q, F)$ to maximize profits.  

12 points

The profit maximizing $F =$ , $Q =$

The quantity discount increases the profit from each type A customer by $
Question 7 (a) Suppose that total demand for movie tickets by students is $Q^S_D(P) = 200 - 20P$, while total demand by non students is $Q^N_D(P) = 160 - 10P$. The movie theater’s cost function is $C(Q) = 800$. 

If the movie theater uses price discrimination then the profit maximizing price $P^S$ for students and $P^N$ for non-students is

\[ P^S = \quad , \quad P^N = \]

The theater’s profit is

If, instead, the firm does not use price discrimination and charges the same price to students and non-students then

the profit maximizing price is $P = \quad$

The theater’s profit is
(b) When going from price discrimination to no price discrimination:  

6 points

The net-benefit of all students **increases** **decreases** (circle the correct answer) by .

The net-benefit of non students **increases** **decreases** (circle the correct answer) by .

Thus, producer + consumer surplus **increases** **decreases** (circle the correct answer) by .
Question 8 (a) Suppose there are two airlines $A$, $B$, offering service between two cities. Their cost functions are given by $C_A(Q) = 10,000 + 20Q$ and $C_B(Q) = 10,000 + 40Q$. Suppose that demand is given by $Q_D(P) = 1,050 - 10P$. Using the Oligopoly model determine the following: 8 points

<table>
<thead>
<tr>
<th><strong>The equilibrium price $P =$</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>The firms’ market shares are $s_1 =$</strong></td>
<td>, $s_2 =$</td>
</tr>
<tr>
<td><strong>$A$’s profit is</strong></td>
<td>, $B$’s profit is</td>
</tr>
</tbody>
</table>
(b) Now suppose that airline $B$ stops offering service on the route and only $A$ remains. Then

The equilibrium price $P =$ , and $Q =$

$A$’s profit is

(c) Determine the change in consumer surplus when moving from (a) to (b).

Consumer surplus increases decreases (circle the correct answer) by

Thus, producer + consumer surplus increases decreases (circle the correct answer) by
Not graded: Use as Scratch Paper
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