诚实考试吾心不虚，公平竞争方显实力，
考试失败尚有机会，考试舞弊前功尽弃。

上海财经大学研究生试题命题纸

(2022-2023 学年第一学期)

课程名称：高级微观经济学 I　命题教师：范翠红

请仔细阅读以下内容，并签名承诺。一旦您签名，将作为诚信承诺的依据，若您在考试过程中出现舞弊行为，将按照学校有关规定严肃处理；若您拒绝进行诚信承诺，将取消考试资格。

考试结束后，考卷必须与答题纸同时上交。未上交考卷，或没有诚信签字的考卷将计以零分。

诚信承诺书

我谨以至诚承诺，在此次考试过程中，我绝无任何舞弊行为，也绝不帮助他人舞弊。

学生签名：

年　　月　　日

1. (20%) Consider a competitive firm with the cost function $C(w_1, w_2, y) = (\ln w_1 + \ln w_2)y^2$, where w_1, w_2 are input prices and y is output. The output price p is random: with probability θ it is "high", p_h, and with probability $1-\theta$ it is "low", p_l. Assume that production decision is made after the resolution of price uncertainty.
   (a) Please compute the supply function $y(p, w_1, w_2)$, the conditional input demand functions $x_i(y, w_1, w_2)$, the input demand functions $x_i(p, w_1, w_2)$, and the profit function $\pi(p, w_1, w_2)$.
   (b) Assume that the owner of the firm is risk averse and his utility function is $u(\pi) = \sqrt{\pi}$, where π is the profit, please calculate the maximum expected utility of the firm's owner. How much would he like to pay for an insurance contract that guarantees a nonrandom output price $\bar{p} = \theta p_h + (1-\theta)p_l$?
2. (15%)
   (a) Please state the properties of a cost function,
   (b) explain whether $C(w, y) := \sum_i w_i y^2 + 100$ is a cost function.
   (c) Please show that $\sum_{j=1}^{n} \frac{\partial x_i(w,y)}{\partial w_j} w_j = 0$, based on the properties of the conditional input demand function.
3. (15%) Suppose a monopolist has the following cost function $C(x) = 3x$ and the market demand function is $x(p) = 13 - p, 0 \le p \le 13$.
   (a) Find its equilibrium output and profit.

(b) What is the socially optimal output?

(c) Suppose the government wants to induce the socially optimal output by subsidizing the monopolist. Calculate the subsidy per unit of output and the overall subsidy.

4. (20%) Consider three firms, $i = 1,2,3$, who choose their own price.There are no fixed costs, marginal costs are constant and normalized to zero. Demand functions are:

$$\begin{aligned} x_1(p_1,p_2,p_3) &= 1-2p_1+p_2+p_3 \\ x_2(p_1,p_2,p_3) &= 1-2p_2+p_1+p_3 \\ x_3(p_1,p_2,p_3) &= 1-2p_3+p_1+p_2 \end{aligned}$$

(a) Determine the Nash equilibrium.

(b) Assume that firms 1 and 2 openly form a price cartel and compete with firm 3. which firm benefits the most from the cartel? Please analyze whether the cartel is stable.

5. (10%) Consider the following game

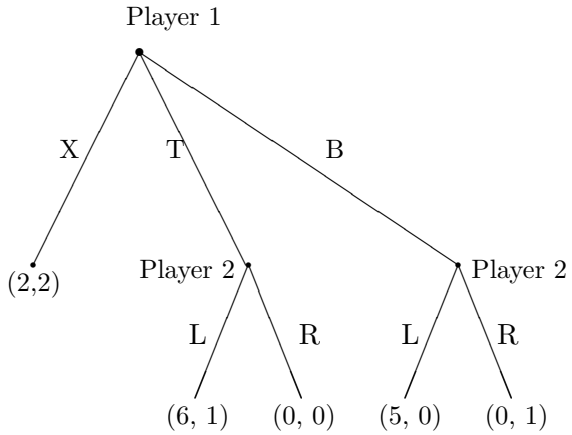
	L	R
T	a,b	c,2
M	1,1	1,0
B	3,2	0,1

(a) For what range of a, b and c is (T,L) an equilibrium in strictly dominant strategies?

(b) For what range of a, b and c is (T,L) a Nash equilibrium?

(c) For what range of a, b and c does the pure strategy M strictly dominate $m_1 = (\frac{1}{2},0,\frac{1}{2})$?

6. (20%) Consider the following extensive game:



(a) Please represent this game in a strategic form (as a matrix).

(b) Find the pure strategy subgame perfect Nash equilibrium.

(c) Suppose the game is modified. When player 2 has to decide, he only knows that player 1 has not chosen X, but does not know whether player 1 has chosen T or B.

i. Please represent the modified game in an extensive form.

ii. Write down the corresponding strategic form (as a matrix).

iii. Find all the subgame perfect equilibria.