1. (10pts) Suppose that three investments have the same three payoffs, but the probability associated with each payoff differs, as illustrated in the table below:

Payoff	Probability (Investment A)	Probability (Investment B)	Probability (Investment C)
$500	0.10	0.30	0.40
$250	0.80	0.30	0.10
$100	0.10	0.40	0.50

   a. Find the expected return of each investment. (3pts)
   b. Eddie has the utility function $U=5Y$, where Y denotes the payoff. Which investment will he choose? (1pts)
   c. Rebecca has the utility function $U=\sqrt{5Y}$. Which investment will she choose? (3pts)
   d. John has the utility function $U=5Y^2$. Which investment will he choose? (3pts)

2. (5pts) Which of the following utility functions are consistent with convex indifference curves?
   a. $U(X,Y) = 2X + 5Y$
   b. $U(X,Y) = \sqrt{XY}$
   c. $U(X,Y) = Min(X,Y)$
   d. $U(X,Y) = \log(X) + \log(Y)$

3. (15pts) Consider a perfectly competitive market of product x with 10,000 identical firms. Cost structure of each firm is $TC = q^2/8 - 9q/4 + 10$. There are 10,000 consumers with the same utility function $u(q,r) = \log(q \cdot r)$, where q is the quantity of product x and r is the quantity of other products. Each consumer has an income of 5 and faces the price $p_q = 0.25$ and $p_r = 1$.
   a. Find the market's supply function of x; (8pts)
   b. Find the market's demand function for x. (7pts)

4. (10pts) A firm's production function is $y = \min\{ax_1, bx_2\}$, where y is output, and x_1 and x_2 are factor inputs with prices w_1 and w_1 respectively. Find the firm's cost function.

5. (10pts) Answer the following questions:
   a. What is the meaning of the second theorem of welfare economics? (5pts)
   b. Discuss its implications. (5pts)

6. （15分）兩位候選人在競選中針對某一議題進行辯論，誰能在此議題中得到較多選民的認同則可於選戰中勝出。假設選民的意見於[0,1]之空間中呈現連續均勻分配，且選民將投票給意見與自己較接近之候選人，試問兩候選人應該如何在[0,1]中選擇其在辯論中的意見立場？（答案5分；推導10分）

7. （10分）候選人在選舉中勝出成為執政者後經常必須面對公共財的提供問題。假設在一僅有兩人的經濟體中公共財的生產函數為 $f(x_1,x_2)=4x_1x_2$，其中x_i是 i 在生產公共財上所下的功夫，其成本對 i=1,2 而言為 $c(x_i)=x_i$，如果 x_i 的最大值為 1，試問在沒有政府干預下，均衡公共財產量為何？（4分）兩人投入公共財生產的努力程度分別為何？（6分）

8. （10分）承上題，若政府進入統籌公共財的生產，其目標為極大化「公共財產量減去其生產成本」，若假設此二人的投入生產公共財的努力程度是可被政府掌握的，試問最適公共財產量為何？（4分）個人被要求的投入努力程度為何？（6分）

9. （15分）公共財的提供問題出在「搭便車」的行為，我們試著以簡單的單期賽局方式說明。在

一僅有兩消費者的經濟體中，假設享受公共財所帶來的好處為 10，而購買此公共財的成本為 15，將產生下面的單期賽局：

消費者 乙

		購買	不購買
消費者 甲	購買	-5, -5	-5, 10
	不購買	10, -5	0, 0

請問納許均衡（Nash equilibrium）為那個策略組合？（7分）此賽局中有嚴格優勢策略（strictly dominant strategy）嗎？如果有，請列出。（8分）