1. Determine whether the following statements are True or False and EXPLAIN. Most marks are for your explanations. (5 points each)

   (a) If buyers and sellers have different information about the goods or service to be exchanged, equilibrium allocation may not be Pareto efficient.

   (b) The Dutch auction and the English auction generate the same expected revenue for the seller if bidders have independent private valuation.

   (c) A rationalizable strategy for player i is not dominated by any other strategies.

   (d) A totally mixed strategy NE is normal-form perfect.

   (e) The First Fundamental Theorem of Welfare Economics says that Walrasian equilibrium is a point at which no improvement in well-being is possible for any consumer.

2. Three consumers, Alfred, Bob, and Carl have the preferences and endowments

$$u_A = x_{1A}^{\frac{1}{2}} x_{2A}^{\frac{1}{2}}, \quad \omega_A = (10, 0)$$

$$u_B = \min(x_{1B}, x_{2B}), \quad \omega_B = (10, 10)$$

$$u_C = x_{1C}^{\frac{1}{2}} + x_{2c}^{\frac{1}{2}}, \quad \omega_C = (0, 10).$$

   (a) Determine the excess demand function z. (10 points)

   (b) Determine if z is homogeneous of degree 0. (5 points)

   (c) Determine if z satisfies Walras' Law. (5 points)

   (d) Determine all equilibrium price vectors and consumption allocations. (5 points)

3. Suppose that bread (b) and wine (w) are produced from capital k and labor l according to the production functions

$$b = 28(k_b l_b)^{1/2} \quad \text{and} \quad w = 7(k_w l_w)^{1/2}.$$

   (a) Suppose the economy is endowed with a total of 64 units of labor and 4 units of capital. Determine the Production possibility frontier for the economy. (10 points)

   (b) If the economy's representative preference is given by $U(b, w) = b^{1/2} w^{1/2}$, how many units of b and w will be produced? (10 points)

   (c) *Now suppose* the economy consists of two consumers: A and B. They have the same preference $U(b, w) = b^{1/2} w^{1/2}$. Consumer A is endowed with 48 units of labor and 1 unit of capital while consumer B is endowed with 16 units of labor and 3 units of capital. Determine the equilibrium allocations, i.e., $(b_A, w_A; b_B, w_B)$. (10 points)

4. Two players A and B can play one of the following games:

G1

		B: L	B: R
A	U	4, 4	0, 0
	D	0, 0	1, 1

G2

		B: L	B: R
A	U	-1, -1	0, 0
	D	0, 0	4, 4

(a) Suppose both A and B know that they are playing game G1. Find all NE of the game. (10 points)

(b) Now suppose they play G1 and G2 with equal probabilities, which is common knowledge to the two. In addition, A knows which game they are playing but B does not know if they play G1 or G2. Model the game as a Bayesian game and find all pure strategy Bayesian NE of the game. (10 points)