1. Suppose that there are two people, 1 and 2, who listen to a radio broadcast. The radio broadcast is a public good in that each unit available is available to everyone. The two people’s marginal benefit curves are exactly the same. The social marginal cost is constant over different levels of broadcast provision. The graph below represents the marginal benefit and marginal cost curves.

![Graph of marginal benefit (MB1, MB2) and marginal cost (MC = SMC) curves intersecting at QT quantity.]

a. Define a Nash equilibrium for the game where the two people simultaneously choose an amount of contribution to the radio broadcast.

b. Show that any division of the quantity \( Q_T \) shown in the graph (where the MB curves intersect the MC curve) is a Nash equilibrium. In other words, \((Q_1, Q_2)\) is a Nash equilibrium if and only if \( Q_1, Q_2 \geq 0 \) and \( Q_1 + Q_2 = Q_T \).

c. Show on the graph the efficient quantity of provision.

2. Give an example of a good in each of the following categories:

a. High cost of exclusion, high degree of rivalness

b. Low cost of exclusion, high degree of rivalness
c. High cost of exclusion, low degree of rivalness

d. Low cost of exclusion, low degree of rivalness

For each of the examples, explain why it has those properties.

3. Consider a society in which there are two types of people, type A and type B. Type A people have a 10% risk per year of catching disease X, a disease which requires $40,000 in medical treatment. Type B people have only a 1% risk per year of catching the disease. Type A and type B people are otherwise indistinguishable, and there is an equal number of both types of people. All members of society have the same utility function over income, $U(I) = I^{1/2}$. There are a large number of insurance companies which insure against the disease.

a. What would be the premium for actuarially fair full insurance for the pooled risk? What would happen if a company offered actuarially fair full insurance aimed at someone whose risk of contracting the disease per year was the average of the two groups’ risks?

b. Describe how an insurance company could offer two policies that separate the two groups (so one group chooses one policy and the other group chooses another). Describe the properties that a separating equilibrium must have if it exists (you don’t have to calculate it, just describe it in words).