Economics 222 Mike Lovell

Quiz #1~Post Mortem

February 18, 1999

Part I: I suspect that the differences in scores on the "define and explain" questions depended as much on examination writing skills as on knowledge. Some answers were much too short.
Here are some partial answers.

1. Non-rival consumption: When the consumption of a commodity (e.g., computer software or the use of a lighthouse but not cookies) does not limit its availability to others. This property, plus non-excludability, characterizes public goods.
2. Position of the least advantaged: The situation of the least well off person in a society. Philosopher John Rawls argued that the focus should be on improving the position of the least advantaged.
3. $MRS^a + MRS^b = MRT$ ~ Efficiency in the production of a public good requires that the sum of the marginal rate of substitutions of individuals for the public good must equal the marginal rate of transformation.
4. Median voter: The voter who is at the median position in the distribution of political opinion ~ no more than half the voters are to the left and no more than half to the right of the median voter. According to Hotteling and Downs, the median voter dominates the ballot box.
5. Intransitive Social Ordering: A ranking of social outcomes that does not satisfy the condition of transitivity; i.e. A is ranked above B, B is ranked above C, but C is not ranked above A.

Part II: (50 points - 25 minutes) The town of Nottingham possesses a beautiful harbor with great potential but there is no lighthouse.

The annual cost of operating the lighthouse will be the sum of the $100.000 annual maintenance cost plus the interest cost of having $1 million tied up in the lighthouse; at 10% interest this sums to $200,000. Note that even if the town could pay for the lighthouse out of a budget surplus, the opportunity cost of the tied up capital would be $100,000 a year - that is the income that would be foregone by building the lighthouse with the surplus rather than putting the $1 million in the bank.

The marginal cost of having an additional boat observe the lighthouse is zero! The inverse demand function is $p = 500 - q/4$, revenue is $R(p) = pq = 500q - q^2/4$ and profits are $\pi = 500q - q^2/4 - \$200{,}000$. Profits are maximized at $50,000 per year with $q = 1000$, $p = \$250$. Consumer surplus is $125,000. The total benefit is $175,000.

Competition among potential lighthouse entrepreneurs might yield the town an annual revenue of $50,000 per year. However, the light house entrepreneurs would not want to undertake the investment in the lighthouse unless they were given the right for ever more. They could be asked to pay the $50,000 each year or $500,000 up front. Or the town could build the lighthouse and lease it out for $150,000 a year with the provision that the operator would pay for maintenance. However the financial arrangement is crafted, it should not affect marginal cost; hence the toll would still be $250 and $q = 1000$.

The town would enforce the toll collection, establishing "excludability." But because there is no rivalry in consumption, the $250 does not lead to an efficient allocation of resources.

Lowering the toll to zero would increase consumer surplus to $500,000 per year with no additional resource cost over the case where a toll of $250 is charged. The benefit of the lighthouse with this procedure is $500,000 + (-200 profit) = $300,000. But such marginal cost pricing ($p = mc = 0$) would lead to a deficit of $200,000 per year.

The so called "second best" solution would be to maximize the sum of consumer surplus plus profits, subject to the constraint that profits cannot be negative. Students who solved the resulting quadratic found two roots. The lowest price - highest quantity root solved the constrained maximization problem.

Another answer might be to finance the public good with general tax revenue, but some tax payers would object that it is not fair to make tax payers who do not use the light house pay for its services; furthermore, taxes can generate inefficiencies.

One student suggested that if the value of lighthouse services to individual users could be estimated, a discriminatory pricing strategy might be invoked, either by a lighthouse entrepreneur or the town; the price charged would depend on the value of the service to the boat, some paying close to $500 and some charged a negligible fee. Discriminating monopoly does not cause an inefficient allocation of resources.

The average score was 82, the mode 90 and the median 83.5.