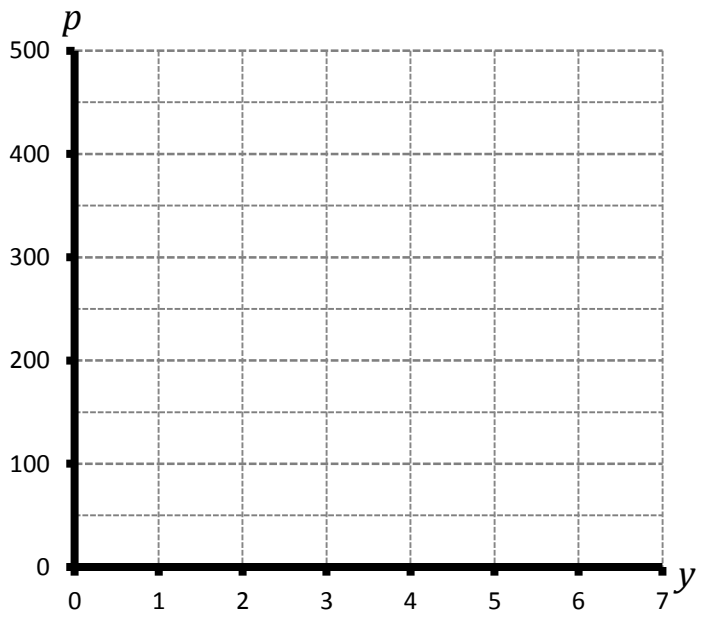
FIRST TEST. ECON 237, FALL 2013. NAME: _____

Fill in the blanks, and answer in the spaces provided. Show your work.

1. Public good (discrete). Four roommates are deciding how many Elvis statues to buy for their common room. The table below gives each individual roommate's total benefit from Elvis statues in dollar amounts (TB_i), given the number of Elvis statues in the common room (y). All roommates have identical feelings about Elvis statues.The marginal cost of Elvis statues is $100.

y	TB_i	MB_i	TSB	MSB
1	120			
2	200			
3	250			
4	280			
5	290			
6	295			
7	295			



a) Fill in the individual marginal benefit (MB_i), total social benefit (TSB), and marginal social benefit (MSB) columns.

b) If the common room decoration process depends on voluntary contribution of Elvis statues with no coordination whatsoever, the Nash equilibrium number of Elvis statues is _____. Total economic surplus in this case is _____.

c) The Pareto optimal number of Elvis statues is _____. Total economic surplus in this case is _____.

d) On the blank graph above, draw the individual marginal benefit function, the marginal social benefit function, and the marginal cost line. In a light tone, shade in the area representing the total economic surplus from the Nash equilibrium. In a darker tone, shade in the area representing the economic surplus that can be gained through coordination on Elvis statue purchasing.

e) Explain how you found the Nash equilibrium in (b). That is, explain why collective purchase of any other quantity of Elvis statues, whether more or fewer, cannot be a Nash equilibrium.

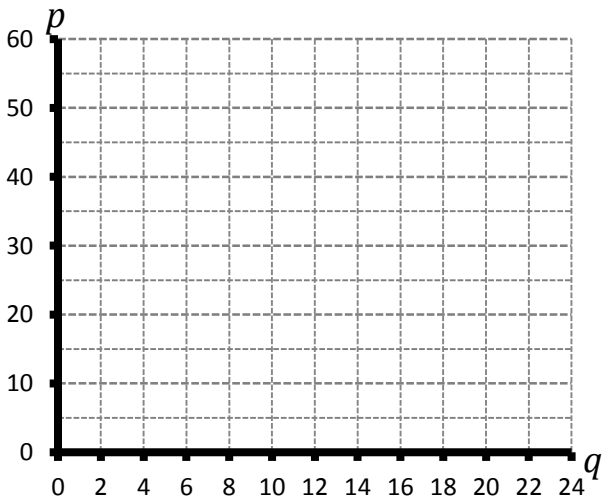
f) Explain how you found the Pareto optimum in (d). That is, explain how collective purchase of any other quantity of Elvis statues, whether more or fewer, creates a situation in which it is possible to make everyone better off.

2. Public good (continuous). Five roommates are deciding how much gunpowder to buy for the defense of their dorm suite. Each individual has the marginal benefit function $MB_i = 12 - \frac{1}{2}y$, where y is the quantity of gunpowder they buy, in pounds. The marginal cost of gunpowder is $MC = 10$.

a) In the absence of coordination, the Nash equilibrium quantity of gunpowder is _____, which gives total economic surplus of _____.

b) The Pareto optimal quantity of gunpowder is _____, which gives total economic surplus of _____.

c) On the graph to the right, draw MB_i, MSB, and MC, shading total economic surplus in the two cases as in problem 1.



3. Public good with heterogeneous preferences. The People's Republic of Blargsburg contains five people, named Person 1, Person 2, etc. They are deciding how big a statue to build to honor their glorious founder, Chairman Blarg. All residents of Blargsburg love Chairman Blarg, but some love him more than others. Thus, the marginal benefit functions for the five people are different:

$$MB_1 = \frac{10}{y} \qquad MB_2 = \frac{12}{y} \qquad MB_3 = \frac{15}{y} \qquad MB_4 = \frac{19}{y} \qquad MB_5 = \frac{24}{y}$$

where y is the height of the statue, in feet. Luckily, they have a very cheap statue-builder in mind, who only charges $p = 1$ dollar per foot.

a) If the people are purely selfish and must contribute to the statue fund in an uncoordinated way, the Nash equilibrium height of the statue is _____ feet.

b) The Pareto optimal statue height is _____ feet.

c) Suppose that it is agreed that each citizen will pay $1/5$ of the cost of the statue, and the height of the statue will be determined by majority rule. Given this agreement, person 1's first choice of statue height is $y_1^* =$_____ feet. Person 2's first choice is $y_2^* =$_____ feet. Similarly, we have $y_3^* =$_____, $y_4^* =$_____, and $y_5^* =$_____. The unique equilibrium in majority voting is $y_{mv}^* =$_____.

d) Explain why y_{mv}^* is a majority voting equilibrium.

e) Compare the Nash equilibrium without coordination in part (a) and the majority voting equilibrium in part (c), in terms of how close they come to the Pareto optimum. Provide some intuition for what you find.

f) If you know the marginal benefit functions of all individuals, you could assign the Lindahl shares $s_1 =$_____, $s_2 =$_____, $s_3 =$_____, $s_4 =$_____, and $s_5 =$_____.

g) Show that, if you assign people these Lindahl shares instead of the equal cost division as in part (c), the majority voting equilibrium will result in a Pareto optimal statue height.

4. Clarke tax. There are five individuals who wish to use a Clarke voting mechanism to chose among four options: A, B, C, and D. Sincere utilities (in dollar amounts) for the different options are given in the first table below. Assuming that everyone votes these sincere utilities, which option will be chosen? _____ Use the table in the middle as an intermediate step toward filling in the tax table on the right.

	A	B	C	D
1	11	2	4	6
2	8	10	2	4
3	6	8	9	2
4	4	6	8	8
5	2	4	6	8

	A	B	C	D

	tax
1	
2	
3	
4	
5	

Explain why voter 2, *acting alone*, can't get a better outcome by either overstating or understating his preference for option B relative to other options.

5. Excludable public good. I just recorded a new rock song. The fixed cost of recording the song was \$400, but now that it is recorded, the marginal cost of letting someone download it is zero. Suppose that demand for the song is given by the marginal benefit function $MB = 12 - \frac{1}{20}q$, where q is the number of downaloads.

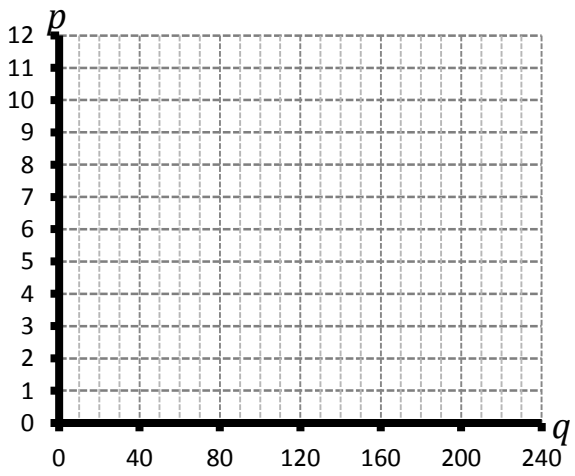
a) If I hand the song over to a profit-maximizing, monopolistic company, what will it charge listeners for each download? $p_m^* =$_____ At this price, there will be $q_m^* =$_____ downloads, consumer surplus will be $CS_m^* =$_____, producer surplus will be $PS_m^* =$_____, and total economic surplus will be $TES_m^* =$_____.

b) Suppose that the government gives me a grant to let everyone download the song for free, and finances the grant using tax revenue. The number of downloads will be $q_{mcp}^* =$_____, and consumer surplus will be $CS_{mcp}^* =$_____. If there is no deadweight loss associated with raising the extra tax revenue, then total economic surplus is $TES_{mcp,1}^* =$_____.

On the other hand, if each dollar of tax revenue used to finance the song causes 25¢ of deadweight loss, then the total economic surplus generated by the song, net of this deadweight loss, is $TES_{mcp,2}^* =$_____.

c) What if, instead of financing the museum with tax revenue, the government decides to charge an admission price equal to average cost (F/q). The Pareto-dominant market-clearing quantity that satisfies this constraint is $q_{acp}^* =$_____, and the corresponding market price is $p_{acp}^* =$_____. The resulting consumer surplus is $CS_{acp}^* =$_____, the producer surplus is $PS_{acp}^* =$_____, and the total economic surplus is $TES_{acp}^* =$_____.

d) In the table to the right, draw the demand curve, the average cost curve, and the marginal revenue curve. Mark the p, q combinations corresponding to each of the equilibria above.



e) Rank alternatives a, b, and c above, from most to least efficient, assuming that there is a deadweight loss associated with the tax revenue used to fund the grant in part (b).

6. Public goods (intuition). Explain why it is more difficult to reveal the information that would be needed to determine the Pareto optimal quantity of a public good (e.g. to determine the Lindahl shares) than it is to reveal the information needed to determine the Pareto optimal quantity of a private good.

7. Efficient markets. Under what conditions do decentralized markets lead to Pareto efficient results? Name these conditions, and argue that a market satisfying them is efficient.

8. Inefficient markets. Aside from the presence of a public good, describe another way in which a market not satisfying your conditions above would lead to an inefficient result, and discuss how collective action in the form of a government might be able to (partially or wholly) remedy this inefficiency.