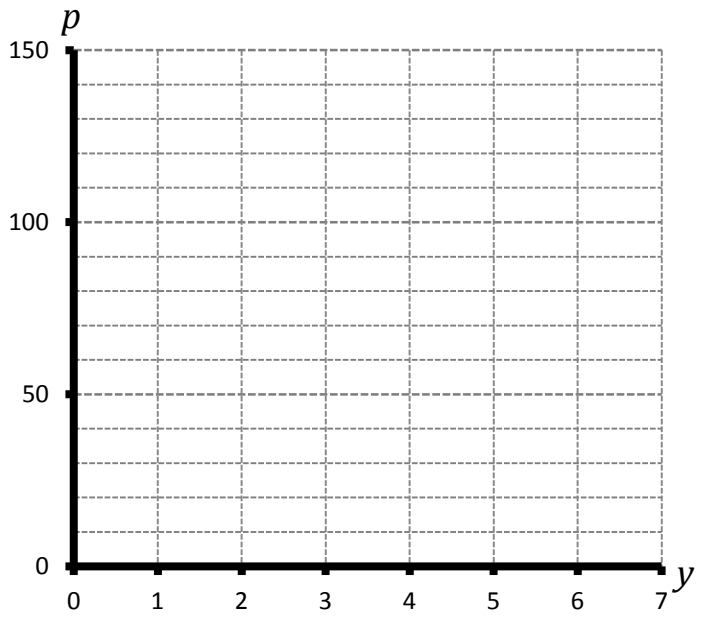
Econ 100D: Principles of Economics NAME: _____

Problem set 4, due Monday 11/4/13

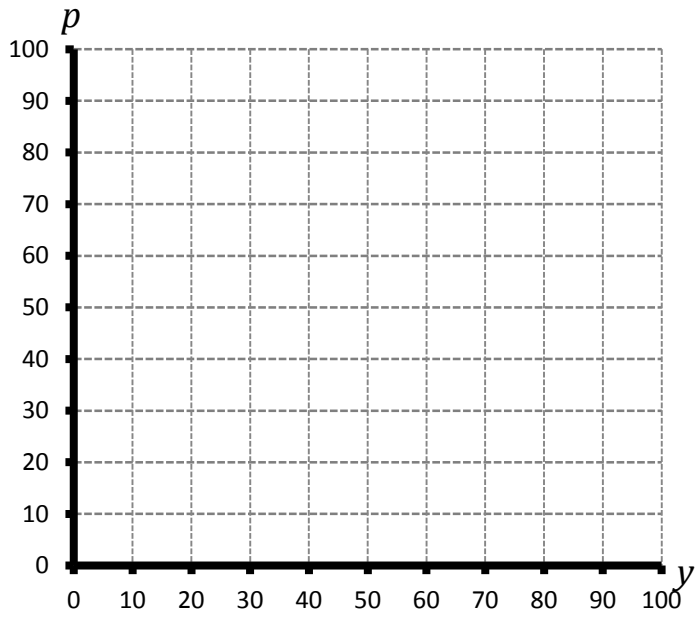
1. Four roommates are deciding how many lava lamps to get for their common room. Suppose that, for their purposes, lava lamps are entirely non-rival and non-excludable, and that each lava lamp costs $30. Each roommate has the same individual total benefit schedule, given in dollar amounts in the column below marked TB_i. Fill in the missing information in the table below, i.e. the columns for MB_i (marginal individual benefit) MSB (marginal social benefit), TSB (total social benefit), TC (total cost), and TES (total economic surplus). If there is no possibility of collective action, and each roommate must decide privately how many lava lamps to buy, then the equilibrium quantity will be _____. However, the socially optimal quantity of lava lamps is _____. Thus, the total amount of economic surplus that can be gained from collective action is _____.

Q	TB_i	MB_i	MSB	TSB	TC	TES
1	35					
2	60					
3	80					
4	95					
5	105					
6	110					
7	110					



On the graph to the left, draw the marginal individual benefit (MB_i) and marginal social benefit (MSB) 'curves'. Mark the equilibrium without coordination (y^*) and the optimum (y^o). Shade in the area that represents the difference in economic surplus between the uncoordinated equilibrium and the optimum.

2. Five roommates are deciding on the size of the TV screen they will get for their common room. Each of the five roommates has the individual marginal benefit function $MB_i = 20 - \frac{1}{5}y$, where y is the width of the screen, in inches. The marginal cost of a screen-inch is constant at $MC = 10$ dollars; that is, a y-inch TV costs $10y$ dollars. If there is no possibility of collective action, and each person must decide privately how much to donate to the 'TV fund', then the equilibrium TV size will be _____, and total economic surplus will be _____. However, the socially optimal TV size is _____, which gives a total economic surplus of _____.



On the graph to the left, draw the marginal individual benefit (MB_i) and marginal social benefit (MSB) curves. Mark the equilibrium without coordination (y^*) and the optimum (y^o). Shade in the area that represents the difference in economic surplus between the uncoordinated equilibrium and the optimum.

Explain as clearly as you can why the uncoordinated equilibrium is an equilibrium, and why the optimum is an optimum. Try to not rely entirely on jargon (e.g. marginal this is equal to marginal that), but rather, to explain it so that someone who hadn't taken an economics course could understand.

3. Optimal government size. Suppose that there is a private good, with a market that is efficient in the absence of taxation, and a public good, that can only be provided by the government, using revenue from a per-unit tax of τ on the private good. Let the marginal benefit and cost for the private good (with quantity x) be as follows:

$$MB(x) = 100 - 2x \qquad MC(x) = 10 + x$$

Let the marginal benefit and cost of the public good (with quantity y) be as follows:

$$MB(y) = 100 - 2y \qquad MC(y) = 20$$

a) No taxation or public spending. First, consider the case in which $\tau = 0$, and thus $y = 0$. With regard to the private good, find the equilibrium quantity, price, consumer surplus, producer surplus, and total economic surplus.

$x^* =$_____ $p_x^* =$ _____ $CS_x =$_____

$PS_x =$_____ $TES_x =$_____

b) Tax of 30: effect on private goods market. Now, consider the case in which there is a tax of $\tau = 30$ on producers. Given this tax, find the equilibrium quantity, price, consumer surplus, producer surplus, government revenue, and total economic surplus.

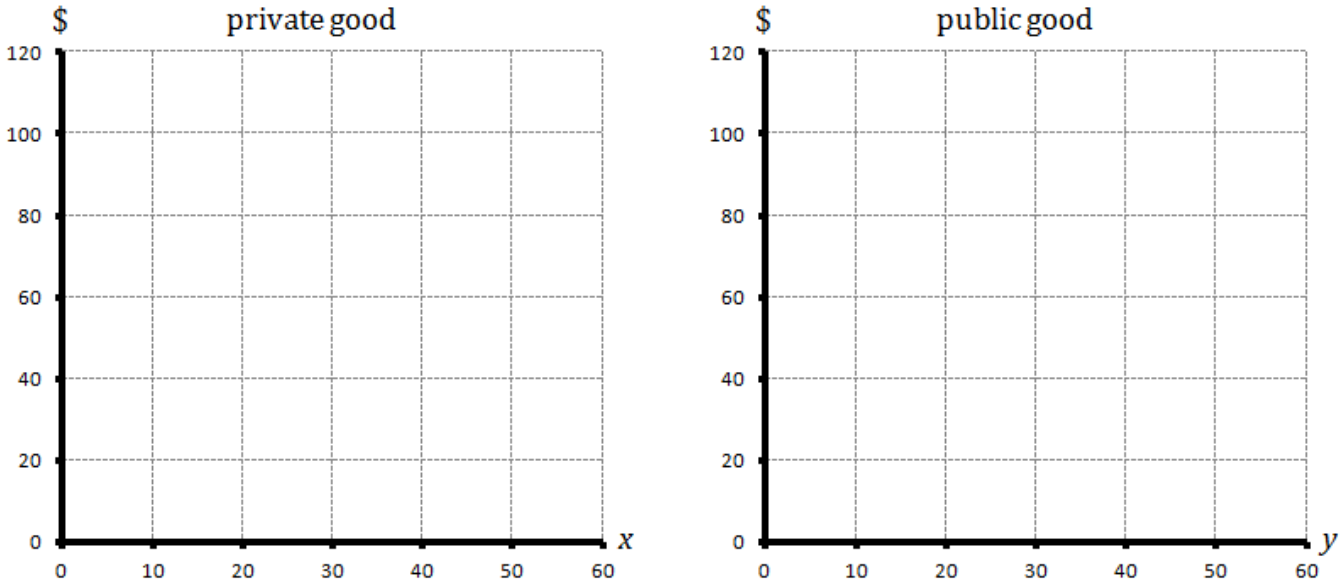
$x^* =$_____ $p_x^* =$ _____ $CS_x =$_____

$PS_x =$_____ $R =$_____ $TES_x =$_____

c) Spending the revenue in the public goods market. If all of the revenue from the tax in 1-2 is spent on the public good, find the amount of the private good that can be provided, the resulting total economic surplus from the public good, and the overall total economic surplus.

$y =$ _____ $TES_y =$_____ $TES_x + TES_y =$_____

d) Graphing. Graph the private goods market, marking consumer surplus, producer surplus, and government revenue. Graph the public goods market, marking total economic surplus.



e) Intuition. What is the meaning of this exercise? What intuition does it give about debates over the size of government? Using the framework of this problem, describe as clearly as possible what is meant by having an optimally-sized government. What is the argument against having a government that is smaller than this (with lower taxes, and less of the public good)? What is the argument against having a government that is larger than this?