Problem set 4, due Tuesday 10/28/2014

1. Negative externality. Suppose the market for a certain good (e.g. 'gasoline') is perfectly competitive, but that the good causes a *negative* externality. Marginal benefit, marginal private cost, and marginal external cost are given by the functions below:

$$MB = 20 - \frac{1}{50}Q \qquad MC = 5 + \frac{1}{100}Q \qquad MEC = 6$$

a) No policy. Given that there is no policy to address the externality, find the equilibrium quantity, price, consumer surplus, producer surplus, external cost, and total economic surplus.

$Q^* =$ _____ $P^* =$ _____ $CS^* =$ _____

$PS^* =$ _____ $EC^* =$ _____ $TES^* =$ _____

Graph the market with no policy intervention, labeling CS^*, PS^*, and deadweight loss (DWL). Why is this area the deadweight loss?

b) Pigovian tax. To maximize total economic surplus, the government should charge a tax of $\tau^o =$ _____ per unit to the consumers. Given this, find the equilibrium quantity, price, consumer surplus, producer surplus, external cost, government revenue, and total economic surplus.

$Q^o =$ _____ $P^o =$ _____ $CS^o =$ _____

$PS^o =$ _____ $EC^o =$ _____ $GE^o =$ _____ $TES^o =$ _____

Graph the market with the subsidy, labeling CS^o and PS^o. Why is there no deadweight loss in this case?

2. Positive externality. Suppose the market for a certain good (e.g. 'education') is perfectly competitive, but that the good causes a *positive* externality. Marginal private benefit, marginal external benefit, and marginal cost are given by the functions below:

$$MB = 200 - \frac{1}{25}Q \qquad MEB = 110 \qquad MC = 60 + \frac{1}{100}Q$$

a) No policy. Given that there is no policy to address the externality, find the equilibrium quantity, price, consumer surplus, producer surplus, external benefit, and total economic surplus.

$Q^* =$ _____ $P^* =$ _____ $CS^* =$ _____

$PS^* =$ _____ $EB^* =$ _____ $TES^* =$ _____

Graph the market with no policy intervention, labeling CS^*, PS^*, and deadweight loss (DWL). Why is this area the deadweight loss?

b) Pigovian subsidy. To maximize total economic surplus, the government should offer a subsidy of $\sigma^o =$ _____ per unit to the consumers. Given this, find the equilibrium quantity, price, consumer surplus, producer surplus, external benefit, government expenditure, and total economic surplus.

$Q^o =$ _____ $P^o =$ _____ $CS^o =$ _____

$PS^o =$ _____ $EB^o =$ _____ $GE^o =$ _____ $TES^o =$ _____

Graph the market with the subsidy, labeling CS^o and PS^o. Why is there no deadweight loss in this case?