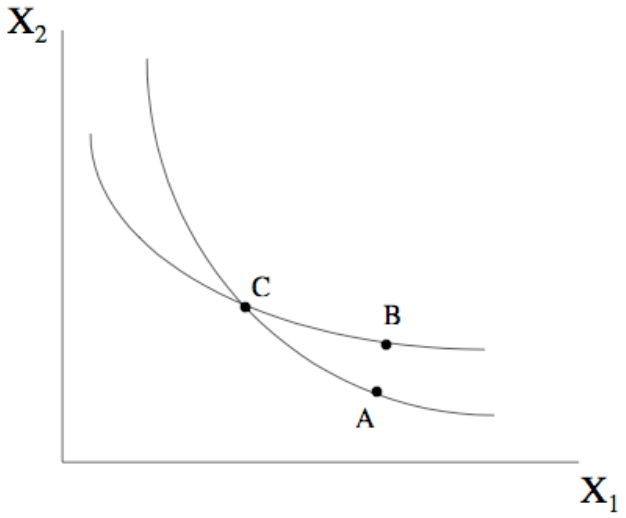
Answer Key for EEP1/ECON3 Midterm **Fall 2007**

1. **True/False/Uncertain?**

   a. **False**. Indifference curves cannot intersect for an individual because we assume that preferences are transitive. We can see why crossed indifference curves violate transitivity below. From our more-is-better (non-satiation) property, we know that B is preferred to A. However, given the way in which we've drawn the indifference curves, the individual is indifferent between A and C, and between B and C, and must therefore be indifferent between A and B.



   b. **False**. The U.S. government has intervened extensively in the development of rural areas since the civil war. Examples of programs include the Homestead Act, the Reclamation Act, loan rate and deficiency payment programs, and the Taylor Grazing Act.

   c. **True**. A consumer's indifference curve reflects his or her preferences over two goods, irrespective of their prices. Price changes affect the slope of a consumer's budget constraint, and thus a consumer's chosen optimal bundle, but not the consumer's indifference curve.

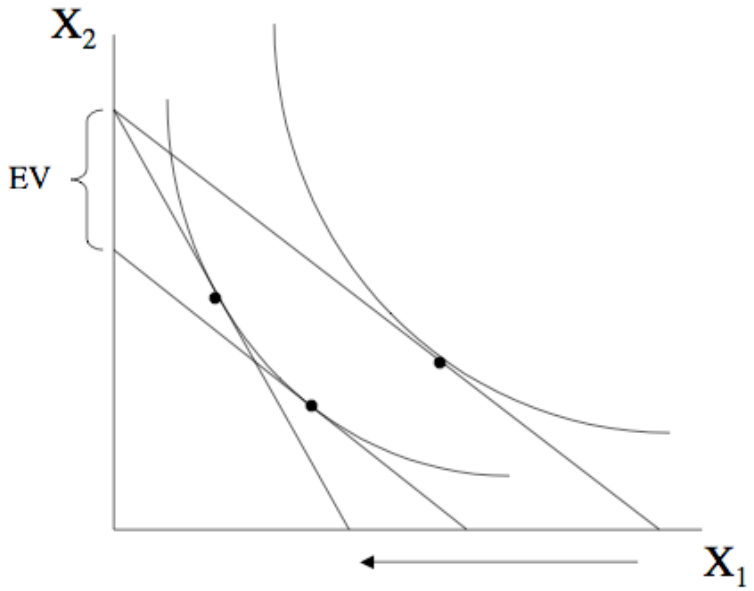
   d. **False**. Coke and Pepsi are examples of substitutes. Thus, if the price of Coke increases, people will substitute towards consumption of Pepsi. Since consumption of Pepsi will increase, the demand curve (not the supply curve) for Pepsi will shift out.

   e. **False**. Recall the price elasticity of demand is equal to the percent change in quantity divided by the percent change in price. As a result, if a price increase of 3 percent leads to a decline in demand of 2 percent, the price elasticity of demand is equal to -2/3.

f. **False**. A subsidy for ethanol production shifts the demand curve for corn out (well-reasoned answers that stated that the supply curve shifts out are acceptable). As a result, the price paid by consumers will increase, thereby leading to a decrease in consumer surplus.

g. **Uncertain**. If a consumer is only consuming normal goods, then an increase in income will lead to an increase in the consumption of all goods. However, if the consumer is currently consuming both normal and inferior goods, then an increase in income will lead to an increase in the consumption of the normal goods and a decrease in the consumption of the inferior goods.

2. We'll use equivalent variation to measure the decrease in welfare that results from a price increase. Recall that equivalent variation (EV) can be defined as the amount a consumer would need to be given (or have taken away) before a price change to avert the change in price. In this case, the price for good X_1 increases, which rotates the original budget constraint towards the origin. This occurs because the slope of a budget constraint is defined by the ratio of the price of X_1 to the price of X_2. As the price of X_1 increases, the slope of the budget line becomes steeper, and thus it rotates towards the origin. This leaves the consumer on a new, lower indifference curve (note that the optimal bundles are given by the point of tangency between a consumer's indifference curve and budget constraint). To find EV, we need to draw a new budget constraint which reflects the original prices but that keeps the consumer on their new, lower indifference curve. This new budget constraint is shown below. The vertical difference between this new constraint and the original constraint gives EV, which indicates the amount that must be taken away to leave the consumer indifferent between a price change and not have the price change occur.



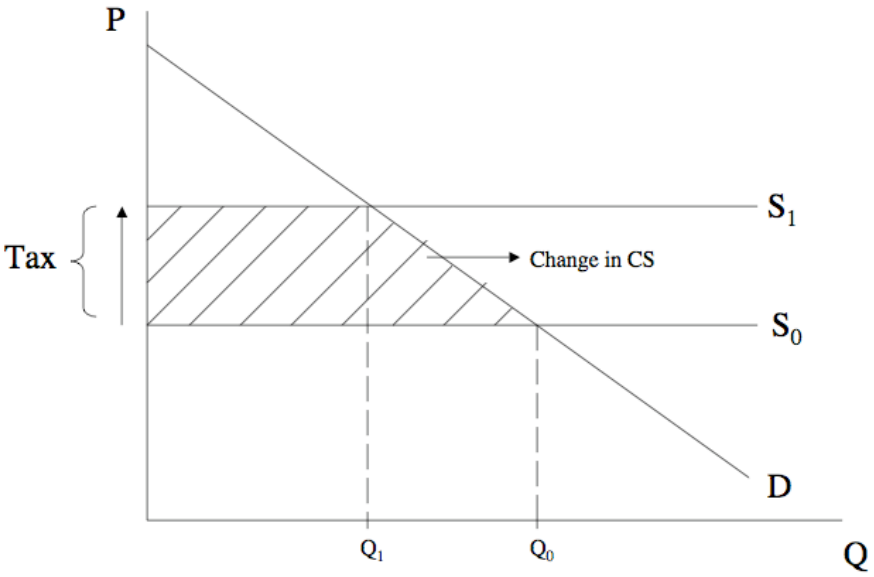
3. We have two options to determine the value of the forest: revealed and stated preference. Revealed preference will, however, not work in this situation. Since the forest is inaccessible, we will not be able to measure the value of the forest based on observations of usage. That is, the forest has a passive/non-use value, which implies that if we were to use revealed preference methods such as travel cost, we would get that the forest's value is equal to zero.

   This leaves us with stated preference methods in which we'll go out and ask people how much they would be willing to pay to know that a lovely redwood forest will continue to exist with small fist-sized birds. Here's how we'll carry out our survey:

   - Give our respondents contextual information regarding the forest and the role of the marbled murrelet in the ecosystem
   - Describe the plan to buy the forest (how much it would cost, how much of the forest would be purchased, etc.)
   - Tell the respondents how the money used for this forest purchase could be used for other projects
   - Ask one of two questions in your survey. Either, "How much would you be willing to pay to preserve this forest?", or, "Would you vote for a tax of $X on your income to support this forest purchase?".

   It is important to note that although stated preference gives us the best shot of accurately valuing the forest, one problem with this method is that people will likely lie/misstate their preferences. Thus, we will need to cautiously interpret the results we get from our survey.

4. Initially, supply is at S_0, and given demand, the equilibrium quantity is equal to Q_0. With the tax, supply shifts up by the amount of the tax to S_1, and equilibrium quantity is now given by Q_1. The change (loss) in consumer surplus is equal to the dashed trapezoid below.



One way to determine whether the tax is a good policy instrument is to compare the benefits of imposing the tax (reduced pollution costs that result because of decreased production) to the tax-related costs (change in consumer surplus). If benefits exceed costs, then the tax is a good policy.

Another way to judge whether the tax is a good policy is to determine if the level of the tax is equal to the per unit cost of the pollution. Specifically, if the tax is equal to the external cost of each unit of production, then the tax is a good policy. Alternatively, if it is either greater or less than the external cost of each unit of production, then the level of the tax should be changed.