Exam #2 (100 Points Total) **Answer Key**

1. (a) Backward induction predicts an outcome of (3, 3).
   (b) No; a Pareto improvement is (6, 6).

2. (a) A Pareto efficient allocation of resources may not be good because of equity concerns or other considerations. For example, it would be Pareto efficient for Bill Gates to own everything (or for one kid to get the whole cake), but we might not find these to be very appealing resource allocations.
   (b) A Pareto inefficient allocation is in some meaningful sense bad because it's possible to make someone better off without making anybody else worse off, so why not do it?

3. The claim that any Pareto efficient allocation is a Pareto improvement over any Pareto inefficient allocation is not true. For example, giving one child the whole cake is a Pareto efficient allocation, and giving each child one-third of the cake and throwing the remaining third away is Pareto inefficient, but the former is not a Pareto improvement over the latter.

4. Consider a division problem such as the division of cake or the allocation of fishing quotas.

   (a) When people trade they bring about Pareto improvements—why would any individual engage in a trade unless it made him or her better off? Pareto improvements are a good thing in and of themselves, and if you get enough of them then you end up with a Pareto efficient allocation of resources.
   (b) i. No. There are multiple Pareto efficient allocations.
   ii. Initial allocations are a matter of equity; economists tend to focus on efficiency. As long as there are opportunities to trade, a Pareto efficient outcome will result *regardless of the initial allocation.*

5. (a) A good prediction is that everybody would choose to not purchase a catalytic converter. For any given driver, purchasing the device would cost \$100; doing without it would impose health costs *on that driver* of only \$.001.
   (b) This outcome is not Pareto efficient. With each resident bearing health costs of \$.001 for each of the 500,000 cars in Seattle, the total health cost for each resident is \$500. A Pareto improvement would be for everyone to buy the catalytic converters, in which case each resident would only bear \$100 in costs.

(c) The central difficulty is *not* that you don't know what others are going to do; you have a dominant strategy, so the other players' strategies are irrelevant for determining your optimal strategy.

A reasonable mechanism might be passing a law that everybody has to purchase a catalytic converter or pay a large fine.

6. It just so happens that eBay is currently running an auction for a collection of *all five* *NSYNC bobblehead dolls. Imagine that your value for such a collection is \$20, meaning that you are indifferent between having the dolls and having \$20.

(a) You should bid less than your true value. Otherwise your expected value from the auction will never be more than zero (and will be less than zero if you bid more than your true value):

$$\text{EV} = \text{Prob(Win)} \cdot (20 - b) + \text{Prob(Lose)} \cdot (0).$$

(b) If the highest bid excluding your own bid is $x > \$20$, you cannot do better than bid \$20 (and lose the auction); the only way to win the auction is to bid more than x, but if you do that then you'll end up paying x, which is more than your true value. On the other hand, if the highest bid excluding your own is $x < \$20$, you cannot do better than bid \$20 (and win the auction, paying $\$x$); raising your bid cannot help you, and lowering your bid doesn't reduce the amount you'll pay, but does increase your risk of losing the auction when you would have liked to have won it.

(c) Yes, in a first-price sealed bid auction you'll get the first-highest price; but we showed above that bidders will bid less than their true value. In contrast, bidders will bid an amount equal to their true value in a second-price sealed bid auction. So even though you only get the second-highest bid, the bid values will be higher than in a first-price auction. (A deeper result here is the revenue equivalence theorem, which says that these two types of auctions have the same expected payoff for seller.)

7. (a) Player 1 moves first and has three options; in each case, Player 2 has two options (accept or reject). So there are 6 different possible outcomes.

(b) If Player 2 is motivated solely by money, Player 1 can anticipate that Player 2 will accept any offer that he makes. If Player 1 is motivated solely by money, he will therefore offer Player 2 the minimum amount (\$1) required in order to get her to accept, thereby maximizing his financial payoff.

(c) i. This is true; otherwise, Player 2 would always have accepted Player 1's offer.

ii. This is false. Player 1's generosity (offering more than $1) might be motivated by altruism, but it might also be motivated by a desire for money: if Player 1 thinks that Player 2 will turn down a lower offer, it's in Player 1's financial interest to offer more.

iii. The basic assumption may or may not be wrong, but this experiment didn't show that it is wrong because optimizing individuals may not be solely motivated by money.