Exam #2 (80 Points Total) **Answer Key**

1. (a) Taking out the dams would not be a Pareto improvement over the existing situation.

   (b) The existing situation is Pareto inefficient. A Pareto improvement would be to use the \$6 billion to take out the dams and provide financial compensation to negatively affected parties.

2. (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.)

3. (a) Backward induction predicts an outcome of (M: 35, PE: 5).

   (b) Yes.

   (a) Backward induction predicts an outcome of (M: 70, PE: 0).

   (b) No; a Pareto improvement is (M: 100, PE: 0).

4. (a) With backward induction, the analysis begins at the end of the game. So: if the game reaches round 2, there are two ounces of cake left. Jill will offer Jack a tiny sliver, knowing that Jack will accept because his only alternative is to reject the offer and get nothing; so if the game reaches round 2, Jill will get a tiny bit less than two ounces of cake and Jack will get a tiny bit more than nothing. Using backward induction, we now look at round 1, where there are three ounces of cake. Jack has to offer Jill at least two ounces of cake, or Jill will reject his offer and go to round 2 (where, as we have seen, she can get two ounces). So we can predict that Jack will offer two ounces of cake to Jill, leaving one ounce for himself, and that Jill will accept the offer.

   (b) Settlement in round 1 results in a Pareto efficient outcome. The Coase theorem indicates that there is a strong incentive for both sides to settle these games in round 1 in order to reach a Pareto efficient outcome. In other words, there is a strong incentive to negotiate a labor agreement before a strike happens, or to settle a lawsuit before it goes to trial.

5. (a) A good prediction is that everybody would drive to work because driving is a dominant strategy: no matter what everybody else does, you always get there 20 minutes faster by driving.

   (b) This outcome is not Pareto efficient because the commute takes 2 hours; a Pareto improvement would be for everybody to take the bus, in which case the commute would only take 40 minutes.

   (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.

   (d) A reasonable mechanism might be passing a law that everybody has to take the bus or pay a large fine.