Final exam

Directions: Answer all 8 questions directly on the exam, in the space provided. If you need more space, use a blank sheet of paper and staple it to your exam when you turn it in.

Problem 1 (15 points) Explain in 3 sentences or less the basic argument that persistently high levels of unemployment may arise as a solution to a moral hazard problem.

Problem 2 (15 points) Suppose that normal workers increase a firm's revenue by \$6, while smart workers increase revenue by $\$A$, where $A > 6$. Firms cannot tell smart workers from normal workers *ex ante*, but can observe a worker's educational level.

Any worker can acquire as much education as she wishes, but getting e years costs a normal worker $B * e$, where $B > 1$, while e years cost a smart worker only e.

a. Solve for e^*, the minimum years of education that smart workers must get to differentiate themselves from normal workers. Your answer will be a function of the variables A and B.

b. As A increases, does e^* increase or decrease? Explain intuitively why this is the case.

c. As B increases, does e^* increase or decrease? Explain intuitively why this is the case.

Problem 3 (15 points) Greg is a day trader, while his neighbor Jennifer is a professor. Greg's income is risky; if he has good luck (probability .5), he makes \$160,000/year. If he has bad luck (probability .5), he makes only \$40,000. Jennifer's job is more stable. She makes \$100,000/year with certainty. Both receive utility $\sqrt{w}$ from wealth w.

a. Would Greg trade jobs with Jennifer if he were given the option? If so, give the maximum amount by which Jennifer's income could be lowered for which this is still true. If not, give the minimum amount by which it would have to be raised before he would choose to switch.

b. Suppose that Greg offers the following deal to Jennifer: If I have good luck, I will give you $\$x$, while if I have bad luck, you will give me $\$y$. Show that it is possible for Greg to choose x and y such that 1. Jennifer accepts the deal (she is made better off) and 2. It is worthwhile for Greg (he is made better off).

Problem 4 (10 points) A company has purchased fire insurance for its main factory. The probability of a fire in the factory without a fire prevention program is .01. The probablility of a fire with a fire prevention program is .001. If a fire ocurred, the value of the loss would be $\$300,000$. A fire prevention program would cost \$80 to run, but the insurance company cannot costlessly ovserve whether or not the prevention program has been implemented.

a. Why does moral hazard arise in this situation? What is its source?

b. Can the insurance company eliminate the moral hazard problem? If so, how? If not, explain why not.

Problem 5 (10 points) A house painter has a regular contract to work for a builder. On these jobs, his cost estimates are generally right: sometimes a little high, sometimes a little low, but correct on average. When his regular work is slack, he bids competitively for other jobs. "Those are different," he says. "They almost always end up costing more than I estimate." If we assume that her estimating skills do not differ between the two types of jobs, what can explain the difference?

Problem 6 (15 points) Answer the following three questions about auctions.

a. Explain why you should bid below your true valuation in a first-price sealed bid auction, but not in a second-price sealed-bid auction (both with private values).

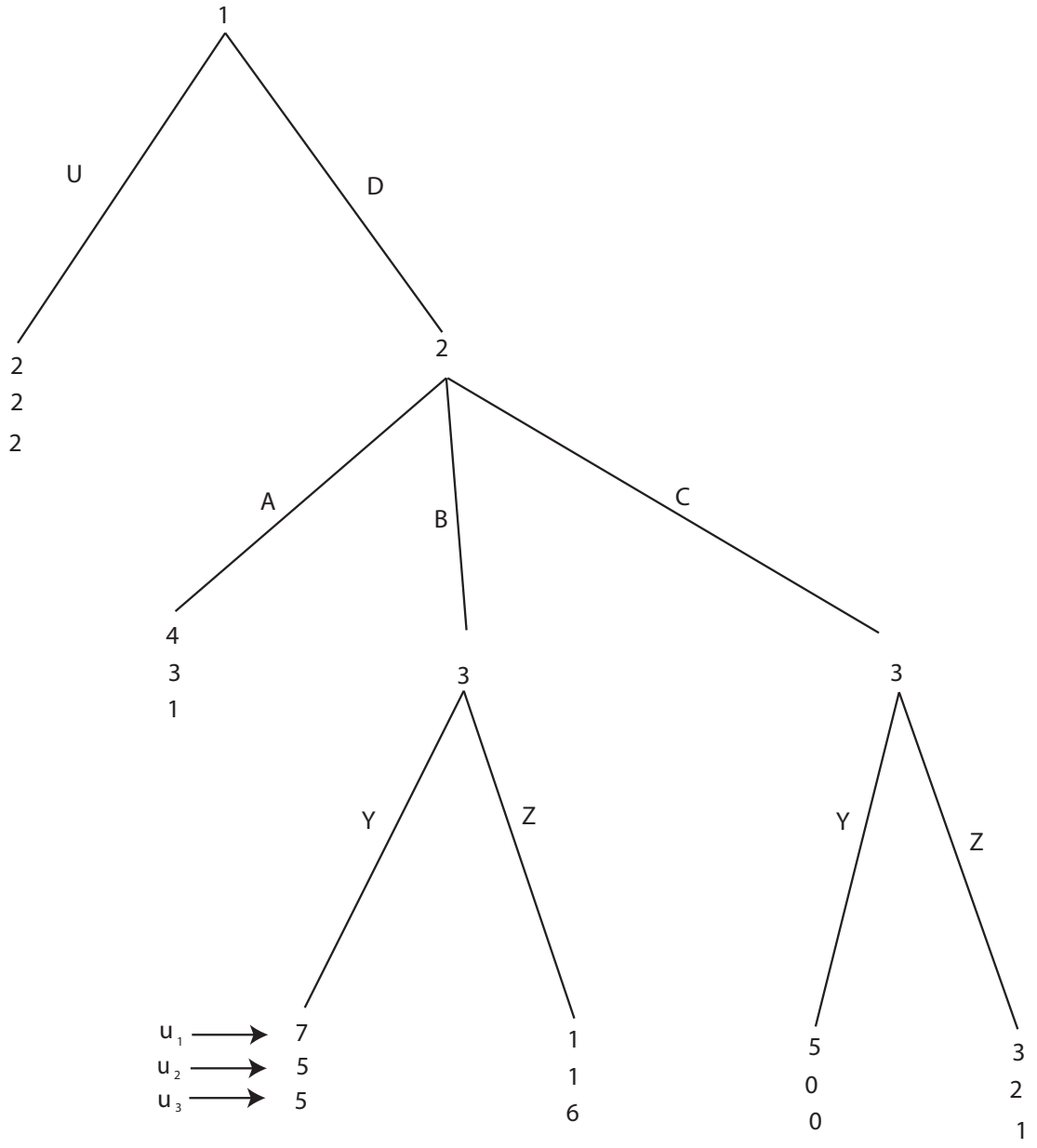
b. As the number of bidders participating in a first-price sealed bid auction increases, how should your bidding behavior change?

c. What do your answers above tell you about how you should bid in an increasing price open auction (like at Sotheby's) relative to a decreasing price open auction?

Problem 7 (15 points) Consider the following interaction between two entrepreneurs (players 1 and 2) who are working on a joint project, and a venture capitalist (player 3) who is a potential investor in the project. First, player 1 decides whether to devote high or low effort to preliminary work on the project. Player 2 observes this choice and then decides whether to devote high or low effort himself. They then make a presentation to the venture capitalist, who can observe which, if any, of the entrepreneurs devoted high effort to the project, and decides whether or not to invest.

The payoffs are as follows. Each entrepreneur gets a payment of 5 if the venture capitalist invests and 0 otherwise. In addition, choosing high effort costs an entrepreneur 1, while choosing low effort is free. Investing costs the venture capitalist 2, but if he invests he gains 3 for each entrepreneur who chose high effort. If the venture capitalist does not invest, his payoff is 0. Draw the game tree corresponding to this game and find its subgame perfect equilibrium outcome.

Problem 8 (5 points) Consider the sequential move game below:



What is the subgame perfect equilibrium outcome?