

- The duration of the exam is 1 hour 20 minutes.
- The exam consists of 8 problems and it is worth 100 points. The extra credit problem will only be counted if you lose points on other problems.
- Please write in the space provided. If necessary, write on the back of the page.
- Please ask me if you have any questions.
- To receive full credit you have to carefully explain all your answers and show all your work.

*General advice: If you get stuck in the early parts of a problem, do not stop there. You can receive substantial partial credit by explaining how you would solve the rest of problem if you had the necessary answers from its previous parts.*

1. (15 points) Determine whether each of the statements is true or false:
  - a. Adverse Selection results from the fact that people who anticipate health problems in the future are more likely to buy health insurance.
  - b. When choosing the preferable project among all admissible projects the benefit-cost ratio method will lead to exactly the same result as net present discounted value method.
  - c. Cost-benefit analysis assumes that the value of human life is infinite.
  - d. The Primary Insurance Amount is calculated in such a way that a poor person's replacement ratio (benefit-to-earnings ratio) is higher than a rich person's.
  - e. Social Security System doesn't benefit young generations at all because they put more in the system than they will get back.

2. (5 points) There is evidence of something called “sheepskin effect” – the increase in wages due to the last year of college is higher than the increase in wages due to third (or first, or second) year of college. In other words, people with four full-time years of college *and a degree* make more on average than people with four years of college *but no degree*. Is this phenomenon more consistent with human capital theory or screening theory? Explain.

3. (25 points) Social Security reform.

a. What is the difference between *pay-as-you-go* and *fully funded* social security systems? What is the reason that Social Security may be in trouble?

b. Name at least three incremental reform proposals.

- c. Name at least two fundamental reform proposals and briefly discuss the problems associated with each.

- d. Do you think that making Social Security voluntary would work?

4. (15 points) Consider a society with equal number of the three types of families X, Y and Z. These families have exactly the same incomes,  $I = \$300$  each. They maximize their utilities by choosing how much education  $E$  and all other goods  $OG$  to consume. All education is privately provided at a price  $P_E = \$3$ , the price of all other goods is  $P_{OG} = \$1$ . These families have different preferences: family X –  $U_X(E_X, OG_X) = E_X^{1/4} OG_X^{3/4}$ , family Y –  $U_Y(E_Y, OG_Y) = E_Y^{1/2} OG_Y^{1/2}$ , family Z –  $U_Z(E_Z, OG_Z) = E_Z^{3/4} OG_Z^{1/4}$ . Recall that for the utility function given by  $U(E, OG) = E^a OG^b$  (such that  $a+b=1$ ) the optimal consumption levels of education and all other goods are given by  $E^* = a^*(I/P_E)$ , and  $OG^* = b^*(I/P_{OG})$ .
- a. Name and briefly discuss at least three reasons for government involvement in the education.

- b. Graph the budget constraint (the same for all families). Determine how much education and all other goods each family will consume and label these points on your graph as x, y and z respectively.
- c. Now imagine that government introduces a public school system that provides 35 units of education for free to anyone who wishes it. It is a take-it-or-leave-it offer – it impossible to supplement education provided by government by privately purchased education. Plot a new budget constraint that all families face. For each family determine whether they would choose to enroll in public school. Is the total amount of educational spending in this country going to be higher or lower as a result?

5. (20 points) Suppose that there are a large number of people in a country. These people have identical incomes and preferences (preferences display the property of risk-aversion). Suppose that all people are different with respect to their probability to get sick and require medical care (assume no two persons have the same probability) and that insurance companies have no way of differentiating among different risk types.
- Explain how Adverse Selection can destroy health insurance market.
  - Name at least two reasons why insurance market is not destroyed (at least not completely) in reality in US.
6. (10 points) Suppose that local government is contemplating a new irrigation project and contracted you to perform the cost-benefit analysis of this project. The project costs \$1000 now, and \$1000 next year, and \$1000 two years from now. The project will generate the gains in agricultural output from the irrigated lands, which amount to \$100 very year starting next year. In addition, the price of irrigated lands will go up by \$2000. The relevant interest rate is 5%. Should this project be undertaken? (hint: the infinite sum can be calculated as  $r+r^2+r^3+\dots=r/(1-r)$ ).



8. (extra credit 5 points) Suppose that Susan makes \$5 an hour. She is maximizing her utility by choosing how many hours to work a week (168 hours total available). Suppose also that government sets up a welfare program with the work requirement. In order to qualify for this welfare program, Susan has to work at least 10 hours a week. After that her benefit follows a familiar schedule ( $B = G - t * w * (LS - 10)$ ); where  $B$  is the benefit level,  $G$  is the basic grant equal to \$200,  $t$  is the benefit reduction rate equal to 0.25, and  $w$  is the wage rate, and  $LS$  is the labor supply). Draw Susan's budget constraint with and without this welfare program. Label everything.