ECON 445
Spring 2007
Professor Paul Rothstein

Final Exam ANSWERS
May 8

Section I: Definitions
(Suggested time 18 minutes)
(48 points: 6 questions each worth 8 points)

Define the following terms. Be precise.

1. Earned income.

   Any of these: wages; wages and salaries; compensation for the supply of labor.

2. The "value added" at a stage of production.

   Any of these: the increment to the value of a good at a given stage of production; the total sales (or the total value of output) less the total cost of material inputs.

3. In models of taxation, the "net price."

   The amount of money the seller keeps on each unit of good sold.

4. Step-up in basis (note: you do not have to define "basis" and you can use that word in your answer).

   The increase in the basis used for determining the capital gain on an asset one acquires through inheritance.

   Alternatively: the market value of an asset one obtains as a bequest on the day one inherits it, which is then subtracted from the market value of the asset on the day one sells it, in order to compute the capital gain and thus the capital gains tax after one sells it.

   (You must properly connect "basis" to the computation of capital gains (alternatively, to capital gains tax) and to inherited assets for full credit. More detailed answers are always welcome.)

5. The social security "legacy debt."

   The debt incurred by the government from offering early beneficiaries much more in benefits than they paid in taxes.

6. Public good.

   Any of these: a good that is nonrival; a good that is nonrival and non-excludable; a good that can be provided to additional individuals with little or no additional cost.

SECTION II: True/False and Explain If False
(Suggested time 36 minutes)
(96 points: 12 questions each worth 8 points)

State whether each of the following statements is true or false. If false, explain your answer convincingly.

7. An example of an ad valorem tax is the federal gasoline tax (which is *truly* 18.4 cents per gallon).

   False. Then, either note that the federal gasoline tax is a unit tax or state that the base for an ad valorem tax depends on the price of the good.

8. The linear tax schedule Tax $= a + b$TI, where TI is taxable income, is regressive if $a < 0$ and $b > 0$.

   False. Then, either state that this tax schedule is progressive (a proof is optional) or state that it is not regressive because the average tax rate increases with taxable income.

9. Under the equal sacrifice principle of fairness in taxation, average tax rates increase with income.

   False. Then, either state that under the equal sacrifice principle that taxes owed increase with income or that the average tax rate can increase, decrease or remain unchanged as income increases.

10. An estate bequeathed to an heir is not taxable income to the heir.

    True.

11. When the income effect (globally) dominates the substitution effect, an increase in the net-of-tax interest rate will cause the quantity of savings supplied to increase.

    False, it will cause the quantity of savings supplied to decrease.

12. The excess burden of a commodity tax increases linearly with the tax rate.

    False, it increases with the square of the tax rate.

13. The Flat Tax modifies the Value Added Tax by having individuals pay tax on their wages and salaries above an exemption.

    True.

14. A table of numbers showing the gross incomes and tax payments for a list of people is sufficient information to know the "incidence" (as economists define that term) of the tax on these people.

    False. To know the incidence, one must also know the incomes they would have if the tax did not exist. (You would then compare those numbers to the incomes after tax.)

15. You are eligible for unemployment insurance even if you quit your job.

    False. Then, either state that to be eligible for unemployment insurance you must lose your job through a layoff, or that you cannot quit your job or be fired for cause.

16. An example of adverse selection is that an increase in disability insurance benefits causes an increase in the number of workers claiming the benefits.

    False, this illustrates moral hazard.

17. The fundamental benefit provided by insurance (either private insurance or social insurance) is consumption smoothing.

    True.

18. Rational individuals obtain little benefit from insurance that protects them against low probability events.

    False. Rational individuals may obtain large benefits from insurance against low probability events that are very expensive.

SECTION III: Problems to Solve
(Suggested time 30 minutes)
(48 points: 6 questions each worth 8 points)

19. Suppose the initial tax on wages is t. By definition, $w_N^0 = (1 - t)w_G^0$. Now suppose the tax increases to t', so $t' > t$. By definition $w_N' = (1 - t')w_G'$. Assume the labor supply curve is flat. What is the relationship between w_N' and w_N and between w_G' and w_G?

    Note! I put on the blackboard that, in the last sentence, w_N should be w_N^0 and w_G should be w_G^0.

The easiest way to solve this is to start with the fact that the net wage cannot change, so $w_N = w'_N$. It is then just algebra to establish:

$$w'_G = \left(\frac{1-t}{1-t'}\right)w^0_G$$

This looks more familiar under the assumption $t = 0$, so then $w^0_G = (1-t')w'_G$. This says that the gross wage rises by the full amount of the tax.

20. Recall the general model of leisure today, consumption today and consumption tomorrow without taxes:

    $$U(\lambda, C_1, C_2)$$

    $$Y = w(24 - \lambda)$$

    $$C_1 = (Y - S)$$

    $$C_2 = (1 + r)S$$

    Introduce a tax on wages and derive the budget constraint. Then, show that there is no substitution effect on the choice of consumption today and consumption tomorrow.

    The tax on wages changes just the first equation:

    $$Y = w(1 - t)(24 - \lambda)$$

    Solving for the budget constraint means using the three equations to eliminate Y and S. This gives:

    $$C_1 = w(1 - t)(24 - \lambda) - \frac{C_2}{1 + r}$$

    Any rearrangement of this is fine.

21. From an analytic perspective, a subsidy is nothing more than a negative excise tax that confers a benefit to certain groups rather than imposing a burden on them. For decades, the federal government has given fairly large subsidies to farmers for producing everything from grain to honey.
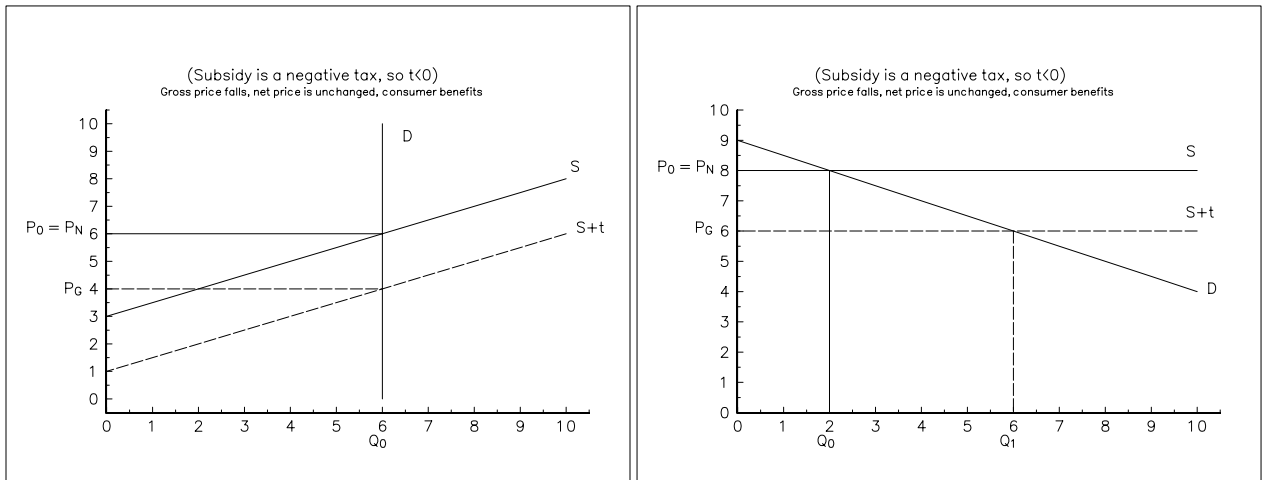
    Draw two graphs illustrating conditions of supply and demand such that the subsidy would be passed along to consumers, lowering the price they pay for honey (for example).

This is just like question 9 on problem set 3. We need the net price to to be unaffected by the subsidy, so the gross price falls by the full amount of the subsidy.

There are two conditions under which this occurs: the supply curve is horizontal (the subsidy induces lots of extra production) or the demand curve is vertical (buyers will not absorb any extra production).

There are three ways to illustrate this: with vertical demand, shift the supply curve; with horizontal supply, shift either the supply or the demand curve.

Two of the three graphs are below. Full credit for any of the three.

22. "The Energy Policy Act of 1992 (P.L. 102-486) created a new federal tax deduction...for individuals or businesses that purchase vehicles that run on alternative fuels.... Taxpayers can deduct from adjusted gross income a portion of the costs associated with the purchase of dedicated alternative fuel vehicles (AFVs).... Dedicated AFV's are new vehicles designed to run on an alternative fuel only. For dedicated AFVs, costs up to $2,000 for qualified property can be deducted for a vehicle up to 10,000 lbs., up to $5,000 for a truck or van of 10,000 to 26,000 lbs., and up to $50,000 for a truck or van over 26,000 lbs." (Congressional Research Service report 97-416.)

Consider the following scheme (surely illegal). Gordon is in the 30% tax bracket. He purchases a dedicated AFV over 26,000 pounds for $200,000, sells it the next day for $190,000, and claims the $50,000 tax deduction. How much money has he made? Show your work.

Gorden lost $10,000 on the sale but he deducted $50,000 on his tax return, saving himself $(.3)(50000) = 15000$ in taxes. His net gain is therefore $5000. (If you also allowed him to deduct the loss, then his net gain increases to $5000 + (.3)($10,000) = $8000.)

23. Suppose 10 people each have the demand $Q = 20 - 4P$ for streetlights, and 5 people each have the demand $Q = 18 - 2P$ for streetlights. The cost of building each streetlight is 3. If it is impossible to purchase a fractional number of streetlights (and we regard streetlights as a pure public good), how many streetlights are socially optimal? Show your work.

Intuitively, we want to find the quantity of streetlights at which the aggregate willingness to pay for an extra streetlight equals the cost of an extra streetlight. The first step is to add the demand curves vertically at each level of Q. This gives:

$$P = (10) \left(\frac{20 - Q}{4} \right) + (5) \left(\frac{18 - Q}{2} \right) = 95 - 5Q$$

Setting this equal to 3 and solving gives 18.4 streetlights. Full credit for saying 18.4 (let's not be too picky) or 18.

24. The Economics Department is having a barbecue for graduating seniors and their families on Thursday, May 17. The probability of rain is .3. If we hold the event indoors the payoff is 500 whether it rains or not. If we hold the event outdoors, the payoff is 1000 if it is sunny and zero if it rains. Which action – holding the event indoors or holding it outdoors – maximizes our expected payoff? Show your work!

The expected payoff if we hold the event outdoors is $(.7)(1000) + (.3)(0) = 700$. The expected payoff if we hold the event indoors is $(.7)(500) + (.3)(500) = 500$. The expected payoff from holding the event outdoors is larger.

SECTION IV: Short Answer
(Suggested time 26 minutes)
(48 points: 6 questions each worth 8 points)

25. Senator Smith suggests eliminating the employee portion of the social security tax and doubling the employer portion of the tax. What does economic theory tell us should happen to the cost of labor (from the point of view of the firm) and the return to working (from the point of view of the worker)? Why?

    Both should be unchanged. Tax incidence is independent of which party sends the money to the government. (More precisely, economic theory predicts that – overnight – employee paychecks will show both a wage reduction equal to the worker's portion of the social security tax and zero social security tax owed. This leaves the workers with the same bottom line. Firm labor costs are also unchanged.)

26. In 2008 (under current law), which of these two groups has the higher percentage of people subject to the Alternative Minimum Tax, people making $100,000 to $200,000 or people making over $1,000,000? Why?

    People making $100,000 to $200,000. The reason is that the highest marginal tax rate under the ordinary income tax is greater than the AMT rate, so ordinary income tax liability will exceed AMT liability when income is high enough. (Technically, "income" here is AGI. Someone with AGI of $1,000,000 may have low taxable income, but it would be very difficult to make taxable income so low that the associated tax liability is below AMT liability.)

27. *NOTE: The following is to be used for questions 27-28.*

    Suppose there are two enclaves in a city, one with healthy people and one with sick people. Both types have the same income. Insurers in the town offer full insurance at the "market wide" actuarially fair premium.

    Suppose both types actually buy the insurance. Is the outcome efficient? Explain.

    The outcome is efficient. Efficiency in this simple models holds if and only if both types fully insure, and they do.

28. If both types buy the insurance, which type is being subsidized?

    The sick people pay less than actuarially fair rates and the healthy people pay more than actuarially fair rates. In this sense, the healthy subsidize the sick. (Note that this is different from mere risk pooling, under which the lucky may be said to subsidize the unlucky.)

29. Recall that the market failure that justifies having social insurance programs is adverse selection. What kind of adverse selection is associated with the social security pension program?

    People have private information about their health. It is likely that private providers of pensions that operate like social security – which makes payments until death – would find that most of their customers have above average life spans. (This would push up the cost of the plans and make them unattractive to the less healthy. They would not buy the insurance, so they would live with the risk of outliving their assets. In other words, they are not smoothing consumption across states of the world. This is inefficient.)

30. What kind of adverse selection is associated with the unemployment insurance program?

    We will accept a range of answers. One possibility is that employees know more about the state of their industry than insurers do. Businesses offering private unemployment insurance would find that most of their customers turn out to be in the riskiest industries. Alternatively, employees may know more about why they become unemployed than insurers do (sympathetic employers may collude with employees). Businesses offering private unemployment insurance would find that most of their customers are free spirits (quit jobs alot) or hot tempered (fired for cause).