Final                                          Name: _____
PPA 723

The total final is worth 30 points.  Each question is worth 2 points, and each sub question is worth an equal share of the 2 points.

1) Say there is a community owned plot of land.  We are deciding whether to put a hockey rink or a set of rose beds on the plot of land.  Five families live in this community, and will share the costs of the project selected equally.  They are meeting to vote on the project tomorrow morning.  Assume a discount rate of 10% is applicable in this case and that the project time horizon is three years (construction year t=0, use year t=1, use year t=2).
   a. If the cost of building the hockey rink is $27,000 right now, and the annual upkeep costs next year and the year after are estimated to be $1,000 per year, what is the present value of costs for the hockey rink project?

   b. If the cost of building the rose beds is $21,000 right now, and the annual upkeep costs next year and the year after are estimated to be $4000 per year, what is the present value of costs for the rose bed project?

Assume you know that the five households have **present value benefits** represented by the marginal willingness to pay figures described in the following table.

|             | Household 1 | Household 2 | Household 3 | Household 4 | Household 5 |
|-------------|-------------|-------------|-------------|-------------|-------------|
| Hockey rink | 4000        | 8000        | 7000        | 10000       | 5000        |
| Rose Beds   | 13000       | 3000        | 5000        | 4000        | 9000        |

   c. If the households vote on these two proposals, will they select the one with the highest net present value?  Explain your answer.

2) Circle the correct answer

| Condition A | Condition B | What type of condition is B for establishing A? |
|---|---|---|
| MP is above AP at q | AP is upward sloping at q | N, NS    S, NN    N,S |
| The firm is a price taker | The market is perfectly competitive | N, NS    S, NN    N,S |
| The market is perfectly competitive | The firm is a price taker | N, NS    S, NN    N,S |
| There is no close substitute for a good | The good is produced by a monopolist | N, NS    S, NN    N,S |
| The firm produces q>0 | In the SR where MC(q)=p, p > AC(q) in a competitive market | N, NS    S, NN    N,S |
| The good is a public good. | The good is characterized by non-exclusion | N, NS    S, NN    N,S |
| A quantity is the profit maximizing quantity | The quantity is produced in an economically efficient way. | N, NS    S, NN    N,S |
| The last dollar rule is satisfied at a bundle | MRS=MRT at a bundle | N, NS    S, NN    N,S |

N,NS :   Necessary, not sufficient
S, NN:  Sufficient, not necessary
S,N:  Necessary and sufficient.

3)  A food stamp policy is put in place in a state.  For our representative consumer impacted by this policy, their initial income of Y is supplemented by a cash value of food stamps of $200.  The initial budget constraint is $y = p_f \cdot f + p_o \cdot o$, where f is food, o is all other goods, and the two prices are subscripted by their commodity.

  a.  Draw the original budget line and the budget line after the food stamp policy is implemented.

  b.  Reproduce the graph you drew for (a) below.  Illustrate on this graph a consumer who has preferences such that their consumption of food will decrease if they are given food stamps worth $200.

4) Deriving demand.
a) Derive a price consumption curve.

b) Derive an individual's demand curve from the graph you drew in (a).

c)  Assume you have individual demand curves like the one you drew in (b) for all members of society and for simplicity assume there are only two members of society. Describe how deriving aggregate (societal) demand for a public good differs from deriving aggregate (societal) demand for a private good.

5) Benefit cost.

Poverty reduction is a major goal of international development agencies. Currently, two strategies are being considered in a country called Landlockia. Both are currently estimated to lead to a 5% reduction in poverty at the end of four year period. The four years are an initial year (t=0) and three years of operation (t=1, t=2, t=3). We will only be able to select one of these strategies. The discount rate is 10%.

Scenario A: Land reform. We will need 14 million USD to pay compensation to the large landholders in year zero. This land will be redistributed to the landless. The formerly landless will need training and support in farming that will cost 3 million per year in each year (t=1, t=2, t=3). It is anticipated that in each of the years t=0 and t=1 the value of agricultural sector production will be 2 million less than it would have in the absence of land reform, while in t=2 and t=3 each it will be 2 million greater than it would have been in the absence of land reform and training. The present value of the increased agricultural production that will result from the land reform program in years beyond t=3 is estimated to be 26 million.

Scenario B: Construct an international airport and develop a flower export sector with the existing distribution of land ownership. If we build an airport, cargo planes will be able to transport our flowers overnight for sale in Holland. It will cost us 7 million dollars in year zero and 1 million per year in each year (t=1,t=2,t=3) to build the airport. It will also cost us 4 million in each of the three years (t=1,t=2,t=3) to develop our flower export industry. Present value benefit of the new flower export industry that will be operational as a result of this project after t=3 is estimated to be 30 million. Present value cost of operating the airport after t=3 are estimated to be 5 million.

a) Calculate Net Present Value for Scenario A.

b) Calculate Net Present Value for Scenario B.

c) Which project should be picked and why?

6) Public goods.
a.  Every summer, a play is performed in an open air theater in a public park.  No admission fee is charged.  We are trying to determine the optimal number of days to perform the play.  In this case, q is the number of days the play will be performed / number of performances (the play is only performed once per day).  There are three people who make up society in this case;  Hortensio, Ophelia, and Yorick.  Hortensio's demand curve for the number of days the play will be performed is defined by $1100-100*q$, Ophelia's is $500-50*q$, and Yorick's is $400-50*q$.   What is total marginal willingness to pay on the societal demand curve for the provision of the fifth day/ performance of the play?  (show how you got this answer)

b.  If it costs 1000 to put on a performance, and no effort is made to avoid the free rider problem, what number of days will the play be performed and who will provide it?

7) The demand curve is given to you as q=20-2*p.

    a. Fill out the following table (use the relatively higher price / relatively lower quantity pair for the denominator in the elasticity calculation)

| Price | Quantity | Elasticity |
|---|---|---|
| 1 | | ------------------------ |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |

    b. Draw this demand curve with price on the y-axis and quantity on the x – axis. Identify the range over which this curve is elastic or inelastic.

8) The price of natural gas in this area has gone up over the past year. Assume each explanation listed below is hypothesized to be the sole cause of this price increase. Which of the following explanations can you rule out, and which can you not rule out.

| Explanation | Rule out         Not Rule Out (circle) |
|---|---|
| Consumers' income in this area has gone up significantly since last year. | Rule out          Not Rule Out |
| A new pipeline was just finished that has made transport costs for natural gas decline. | Rule out          Not Rule Out |
| The price of electricity has gone down over the past year. | Rule out          Not Rule Out |
| New safety standards in processing natural gas are more costly to meet. | Rule out          Not Rule Out |
| Oprah had on a guest recently who had written a book arguing that eating foods cooked with natural gas leads to faster weight loss than eating foods cooked with electricity. | Rule out          Not Rule Out |
| A specific tax on producers has been introduced for natural gas in the past year. | Rule out          Not Rule Out |

9) Circle the correct answer.

| Statement | The statement is (circle the correct answer) |
|---|---|
| The expansion path traces out all points that are economically efficient. | True          False |
| Consumer surplus is calculated as the area below the demand curve and above the price line. | True          False |
| The slope of an indifference curve is called the marginal rate of transformation. | True          False |
| The income elasticity of demand for an inferior good is a negative number. | True          False |
| A private good is non-rival and non-excludable | True          False |
| Increasing the discount rate increases future costs in present value terms. | True          False |
| A monopsonist is the single buyer of a good. | True          False |
| The perfectly competitive market takes us to the socially optimal outcome even if there is an externality generated in production of that good. | True          False |

10) Match the outcome to the policy that could generate it and **show the impact on a supply and demand curve**.  Label all curves, axes, and points.

**Policy**:
*Price floor.*
*Price ceiling.*
*Imposition of a specific tax on producers.*
*Decrease in price of an input used in production.*

**Outcome**                                                    **Policy**

Excess Supply                                    _____



Equilibrium price paid by consumers              _____
increases and quantity sold decreases



Excess demand                                    _____



Equilibrium price paid by consumers              _____
decreases and quantity sold increases

11) The demand curve is defined by the relationship p=20-4*q. Marginal cost / supply is defined by the curve MC=4.

    a.  What is the price quantity equilibrium if the market structure is perfectly competitive?

    b.  What is the price quantity equilibrium if the market structure is monopolistic?

    c.  If there is an externality generated by production that can be expressed as $MC^E=4*q$, what is the socially optimal equilibrium in a perfectly competitive market?

    d.  What specific tax $\tau$ could be charged in the perfectly competitive market to achieve the socially optimal outcome?

12) Continue with the information in problem 11.
   a. Draw on a single graph the outcomes of a-d. Label everything.

   b. Identify the magnitude of consumer surplus, producer surplus, externality, tax revenue if applicable, and total social welfare.

| | Perfect Competition | Perfect Competition with tax | Monopoly | Socially optimal |
|---|---|---|---|---|
| Consumer Surplus | | | | |
| Producer Surplus | | | | |
| Externality | | | | |
| Tax Revenue | | | | |
| Total Social Welfare | | | | |

13) Complete the following table.

| a) Quantity of Output | Fixed Cost | Total Cost | Average Cost | Marginal Cost | Variable Cost | Average Variable Cost |
|---|---|---|---|---|---|---|
| 0 | | 14 | ------------ | --------- | ---------- | ------------- |
| 1 | | | 34 | | | |
| 2 | | | | | 39 | |
| 3 | | | | | | 19 |
| 4 | | | 22 | | | |
| 5 | | 106 | | | | |
| 6 | | | | 19 | | |
| 7 | | 145 | | | | |
| 8 | | | | 21 | | |

b. If the market price for the output produced is 20 and the market structure is competitive, what level of output is the profit maximizing level of output, and why?

c. Is this a short run or a long run cost table?  Why?

14) Two adjacent states, call them state A and state B, have the river that runs between them as their main source of water. Each is currently deciding how much water should be taken from the river and treated to be used in the domestic water supply in the coming month. For each state, the control for the pipe that draws the water from the river has three settings; low, medium, and high. The more total water is taken out, the lower the water level drops, which can reduce the flow of the water into the respective pipes. Each cell in the table describes the amount of water each state will draw from the river in cubic meters when each state selects the pipe control setting described.

| | | State B | | |
|---|---|---|---|---|
| | | Low | Medium | High |
| State A | Low | 50,000  50,000 | 45,000  100,000 | 40,000  110,000 |
| | Medium | 100,000  45,000 | 80,000  80,000 | 60,000  85,000 |
| | High | 110,000  40,000 | 85,000  60,000 | 70,000  70,000 |

a) Describe the full set of best response strategies for each state.

b) What is the Nash Equilibrium outcome of this game?

c) Is there a negative externality imposed by one decision maker on another in this game? If so, how do you know there is one? / If not, how do you know there is not one?

d) Does having the two states coordinate their actions offer the potential for a Pareto improving outcome? Why or why not?

15) Syracuse University is considering raising the price for a season's ticket for all men's basketball home games next year from $355 to $375. This year, at a price of $355, they sold 15,000 season's tickets. The best available information suggests that the price elasticity of demand for season's tickets is -0.5.

a. What is the predicted number of season's tickets sold next year if the price is raised?

b. Compare total revenue for the two prices. Which is higher?

c. What will be the predicted revenue for next year if the elasticity is not -0.5 as assumed above, but is in fact -1.25?

Work Page 1

Work page 2