



2) Monopoly. Inverse demand is  $p=36-2q$ . The marginal cost of production is  $2q$ .

a. What is the equilibrium outcome if the producer is a monopolist?

b. What is the equilibrium outcome if the producers are in a perfectly competitive market?

c. Illustrate these two areas on a graph.

d. Calculate the values in the following table.

	Monopoly	Perfect Competition
Consumer Surplus		
Producer Surplus		
Dead Weight Loss		
Total Social Welfare		

3) The demand curve is given to you as  $q=600-50*p$ .

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
\$1.00		-----
\$2.00		
\$3.00		
\$4.00		
\$5.00		
\$6.00		
\$7.00		

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.

4) 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
Producer surplus is calculated as the area below the demand curve and above the price line.	True	False
The cross-price elasticity of a complement is a positive number.	True	False
The income elasticity of demand for a normal good is a positive number.	True	False
The Internal Rate of Return is the value of $r$ at which present value benefits equal present value costs for a project.	True	False
The slope of an isoquant is called the Marginal Rate of Substitution (MRS)	True	False
A club good is excludable and non-rival.	True	False
The free rider problem leads to under provision of a public good.	True	False
The Marginal Cost (MC) curve crosses the Average Fixed Cost (AFC) curve from below at the minimum value of AFC, after which AFC will begin to increase.	True	False
At the optimal bundle, $MU_{x1}=MU_{x2}$	True	False

5) Budget Constraints. There are two goods, food (f) and other (o). The price of food is  $p_f$ , the price of other is  $p_o$ . Income is  $Y$ . The budget constraint is  $p_f \cdot f + p_o \cdot o = Y$ .

- a. Draw the budget constraint and indifference curves for a consumer showing the optimal bundle with the original budget line and after the consumer has received food stamps of cash value  $FS$ . Illustrate on this graph preference for a consumer for whom **it does matter** whether they get the value of  $FS$  as constrained food stamps or as unconstrained cash.

- b. Compare the consumption level of food and other before the food stamps were given and after food stamps are given in the graph you drew. Are food and other normal or inferior goods in your graph?.

6) Information issues

a. Illustrate the deadweight loss of uninformed demand if there is negative information about the good consumers find out about when there is informed demand.

b. Contrast the problem of adverse selection with the problem of moral hazard.

7) Production functions.

a) Draw the production function  $Q=f(L, \bar{K})$  noting areas that are not feasible, not efficient and at the frontier of technological efficiency.

b) Show what technological progress looks like on a production function such as the one you drew for (a)

c) Draw an isoquant of the production function  $Q=f(L, K)$  and label it  $Q'$ , noting areas that contain combinations of inputs that are: not feasible; not efficient; and at the frontier of technological efficiency for producing  $Q'$ .





9) Public goods.

There are three students left who are currently attending classes in the classrooms of the Maxwell School. They each have an inverse demand curve for the number of air purifiers ( $q$ ) that should be installed in the school. David's demand is  $\$550 - \$10 \cdot q$ . Mary Pat's demand is  $\$320 - \$40 \cdot q$ . Carol's is  $\$330 - \$15 \cdot q$ .

- a. If the marginal cost of purifiers is constant at  $\$480.00$  per unit and no effort is made to avoid the free rider problem, what number of purifiers will be provided and who will provide them?

- b. What is the socially optimal number of purifiers that should be provided?

10) Cost.

a. Complete the following table.

Total Output	Fixed Cost	Total Cost	Variable Cost	Average Variable Cost	Average Fixed Cost	Average Cost	Marginal Cost
0		10	-----	-----	-----	-----	-----
1						25	
2				19.5			
3			44				
4		71					
5							18

b. Is this short run or long run cost information? Why?

c. If market price for the output produced is 17, what level of output is profit maximizing for a firm if the market structure is perfectly competitive?

11) Game Theory.

Target and Old Navy have entry points that are side by side in a strip mall. A guard costs \$4 to hire and will sit between the two doors. The benefit of a guard at the main door that they will not suffer losses from theft (0 is the payoff). The baseline is no guard for either, each suffers theft losses of -3. If one hires and the other does not, each store will benefit from the avoided losses because of the guard but the store who hired has to pay the guard. If both hire, they pay both, but two guards are no more effective than one.

		Old Navy			
		Hire		Don't hire	
Target	Hire	-4	-4	-4	0
	Don't Hire	0	-4	-3	-3

a) Describe the full set of best responses and identify the Nash Equilibrium.

Can they arrive at a Pareto improving outcome if Old Navy and Target come to an agreement to split the cost of one guard (\$2 each)? Here if they honor the agreement, they get the benefits of the guard (0 losses) but pay 2 each (-2, -2). A store can also renege (refuse to honor the agreement). If one store honors and the other reneges, the store that honors pays the full cost of the guard while the other gets the full benefits (-4, 0) or (0, -4). If they both renege no guard is hired and they continue to suffer losses (-3, -3). The payoffs are as follows.

		Old Navy			
		Honor		Renegue	
Target	Honor	-2	-2	-4	0
	Renegue	0	-4	-3	-3

b) Describe the full set of best responses and identify the Nash Equilibrium.

c) In what sense is the (Honor, Honor) outcome potentially Pareto improving on the (Renegue, Renegue) outcome?

12 Benefit cost.

We are evaluating proposals for use of decentralized climate funds in Mali. These are funds available to help local communities fund public goods that will help them adapt to anticipated climate change. The time horizon and our planning horizon is four years:  $t=0,1,2,3$ . One community has the following proposal.

**Irrigated rice zone where rain-fed cultivation currently takes place.** The fences, retaining walls, and canals of the irrigated zone will cost \$150,000 to construct in year zero. During the construction year  $t=0$  no cultivation will take place in this field. Once construction is finished, maintenance and repair of the zone are expected to cost \$19,000 in years 1, 2, and 3. The benefit of building this zone is that it will allow two harvests from this irrigated area in years 1,2, and 3 where currently they are able to have one rain-fed harvest per year. Each rice harvest is worth \$69,000, so if we have 2 harvests per year that is \$138,000 per year. Input costs for a single growing season are \$12,000 per season under both rain fed and irrigated cultivation, so \$12,000 per year rain-fed and \$24,000 per year under irrigation with two crops per year. The discount rate is 5%.

a) What is the NPV of the ‘without’ (rain fed) scenario over years 0,1,2,3?

	Benefit	Cost	Benefit-Cost
T=0			
T=1			
T=2			
T=3			
Present Value			

b) What is the NPV of the ‘with’ (irrigated) scenario over years 0,1,2,3

	Benefit	Cost	Benefit-Cost
T=0			
T=1			
T=2			
T=3			
Present Value			

c) Would my evaluation of which is better, ‘with’ or ‘without’ change if the irrigated system allowed for 3 harvests per year rather than 2? Why or why not?

	Benefit	Cost	Benefit-Cost
T=0			
T=1			
T=2			
T=3			
Present Value			

13) The average price of a gallon of cider has **increased** in Central New York since this time last 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)
Incomes in Central New York have increased since last year.	Rule out	Not Rule Out
Consumer preferences have shifted away from hard seltzer to hot spiced cider.	Rule out	Not Rule Out
The weather this year was very good for apple production, so the apple harvest was 15% above average.	Rule out	Not Rule Out
A facebook post claiming apple cider is effective in protection against Covid 19 went viral.	Rule out	Not Rule Out
Cornell plant pathologists identified the new fungal pathogen that caused bitter rot disease in apples. They said it is why this year's harvest was 30% below last year's harvest.	Rule out	Not Rule Out
People frequently consume donuts together with cider and the price of donuts has increased dramatically this year due to a supply chain disruption	Rule out	Not Rule Out

14) Syracuse University is proposing to raise the price for season tickets for men's home basketball games in the upper tier to \$810 next year. This year, at a price of \$710, they sold 8,642 season tickets. The best available information from the past three years suggests that the price elasticity of demand for season tickets is  $-0.75$ .

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

b. Compare total revenue this year with predicted revenue for next year. Which is higher?

15) Public goods, voting, and benefit cost.

A community of five people is voting to decide on public good provision. There are three proposals related to the new omicron variant of the virus:

Proposal A: Install a N95 mask dispenser in front of town hall where residents can obtain a new mask whenever they want one. Total cost is \$5,000 (\$1000 each).

Proposal B: Assemble a box filled with personal protective equipment, hand sanitizer, take-out menus, and gift cards that can be used to order take-out meals and leave it at each household. Total cost is \$7,500 (\$1,500 each).

Proposal C: Build a vaccination clinic in the town hall with freezers that can keep things cold as low as negative eighty degrees Celsius to deliver free Covid vaccines. Total cost is \$10,000 (2,000 each)

This table records each household's WTP for each proposal.

	Proposal A- mask	Proposal B-box	Proposal C-clinic
Atlas	\$10	\$100	\$5
Fauci	\$2,000	\$2,200	\$3,900
Birx	\$1,900	\$2,400	\$4,500
Adams	\$900	\$1,600	\$1,900
Azar	\$190	\$100	\$295

a) How will they vote for each proposal and which proposal or proposals will pass with a majority? (circle)

	Proposal A		Proposal B		Proposal C	
Atlas	Yes	No	Yes	No	Yes	No
Fauci	Yes	No	Yes	No	Yes	No
Birx	Yes	No	Yes	No	Yes	No
Adams	Yes	No	Yes	No	Yes	No
Azar	Yes	No	Yes	No	Yes	No
Pass or not?						

b) If the costs are present value costs, and the willingness to pay figures are present value benefits, what is the net present value of each proposal?

Proposal A- mask	Proposal B - box	Proposal C – clinic

c) Did voting lead us to select the proposal that had the highest net present value? Explain why or why not.

Work Page: