

EQUATIONS YOU MAY NEED FOR THIS EXAM

Depreciation = (Purchase price - salvage value) / years of useful life

Average Value = (Purchase price + salvage value) / 2

Slope = change in Y / change in X or change in P / change in Q_d

Percent change in Q_d = $[(Q_1 - Q_0) / Q_0] \times 100$

Percent change in P = $[(P_1 - P_0) / P_0] \times 100$

Marginal revenue = change in total revenue / change in Quantity of control variable

Marginal cost = change in total cost / change in Quantity of control variable

Average Relative Price_i = (Nominal Price_i/CPI_i) X 100 Where i = year
in 1982-84 dollars

Economic Efficiency = Value of Output / Value of Input
= (Units of Output * Price of Output) / (Units of Input * Price of Input)

EXPLANATION OF TERMINOLOGY USED

Graph = accurately scaled, precisely plotted, accurately drawn to scale, and labeled.

Rough sketch or illustrate = not scaled or precisely plotted, but completely labeled.

What "explain" means on one of my exams:

Websters Collegiate Dictionary defines EXPLAIN as:

1. to make plain or understandable
2. to give the reason of or cause of
3. to show the logical development or relationships of

Websters continues by enhancing the definition with the following statement:

"Explain implies a making plain or intelligible what is not immediately obvious or entirely known."

**SHOW ALL YOUR WORK IN A NEAT AND ORGANIZED
MANNER**

Exam #2 ARE 012, Spring 1997

Answer the five (5) questions below. Do all parts of each question. Use a separate sheet of paper to answer each number question, and arrange your answers in numerical order when finished with the exam. Write the number of each question and your name on the top of each sheet of paper you use. **You must show all work to receive full credit.** The opportunity cost of all parts of each question is provided so that you may make an informed management decision regarding the production of this exam. **DO NOT** write answers on the test sheets except for the table in Question #5 and Bonus Question #2. Be thorough and complete in ALL your responses. **RETURN THE TEST SHEET !!!** No test sheet: F for the exam.

Please read and sign the Honor Pledge on the test sheet below:

I have neither given or received unauthorized aid on this exam. _____

Student's Signature

1 Given the production possibilities schedule below, what is the opportunity cost of increasing the value of Ag. Commodities from \$ 0 to \$ 200 Billion ? (Below, B=billion) **(5 points)**

| | | | | | | | |
|--------------------------------|----|-----|-----|-----|------|------|------|
| \$value of Ag. Commodities | \$ | 0B | 40B | 80B | 120B | 160B | 200B |
| \$value of Non-Ag. Commodities | \$ | 80B | 76B | 64B | 48B | 28B | 4B |

a. Calculate the **opportunity cost** of increasing the value of Ag. Commodities: **(5 points)**

From \$0 to \$ 40B ?

From \$ 40B to \$ 80B?

From \$ 80B to \$120B?

From \$120B to \$160B?

From \$160B to \$200B?

b. What economic law do your answers in (a) above demonstrate? **(5 points)**

c. Explain the basic reason why the economic law you identified in (b) above exists as we move along a downward sloping, bowed out production possibilities curve. **(5 points)**

2. You have just purchased a new half ton pickup truck for \$23,000 including all sales taxes. You expect to drive the truck 18,000 miles each year. You plan to drive the truck 5 years then sell it for \$11,000. Auto insurance will cost you \$750 per year for liability. Collision with \$500 deductible, and comprehensive with no deductible will cost you \$24 per \$1,000 of coverage. The property tax rate in your city and county is \$1.15 per \$100 of value. You paid cash for your new truck, but you had to withdraw the money from your money market account currently paying 3.0 percent interest. Tags will cost you \$26.50 per year. Annual inspections will cost you \$19.50 per year.

a. For this truck, please calculate or record the following annual ownership costs: **(Organize and neatly SHOW ALL WORK and answers) (10 points)**

Depreciation, Interest, Property taxes, Insurance, Tags, Inspection fee, and Total Annual Ownership Cost.

b. Total annual operating cost for this vehicle (gas, oil and grease, tires, general maintenance) is \$1,550 per year. Please calculate total ownership and operating cost per **MILE**. **(10 points)**

3. In 1973, I was 16 years old and the price of a gallon of regular gasoline was \$.48. Today, I can purchase a gallon of regular gasoline for \$1.20. The CPI index (1982-84) in 1973 was 44.4, and in February of 1997 it was 159.6. **SHOW ALL OF YOUR WORK !!!**

- a. First calculate the percentage change in the CPI index from 1973 to 1997. Then calculate the percentage change in the price of gasoline from 1973 to 1997. What has happened to the "real" price of gasoline since 1973 ? **(5 points)**
- b. In 1973, I regularly worked for \$.75 per hour cash (off the books). How many hours did I have to work to buy one gallon of gasoline at the \$.48 per gallon price? **(5 points)**
- c. Assume you can earn \$5.50 per hour cash (off the books) today. How many hours must you work to buy a gallon of gasoline at today's price of \$1.20 ? **(5 points)**
- d. Write down the hours I had to work to buy 1 gallon of gas in 1973. Again, assume you are earning \$5.50 per hour cash (off the books). If you had to work the same number of hours to buy a gallon of gasoline as I did, what would today's nominal price of gasoline per gallon have to be? **(5 points)**

4. Accurately **graph** the following demand schedule for 7 to 8 ft. Purple Leaf Plum trees for the Three Stooges Garden Center during the Spring planting season. **(ACCURATELY GRAPH TO SCALE AND LABEL.) (10 points)**

| <u>Price</u> | <u>Quantity demanded per month</u> |
|--------------|------------------------------------|
| \$60 | 20 |
| 44 | 60 |
| 36 | 80 |
| 28 | 100 |
| 12 | 140 |
| 4 | 160 |

- a. Calculate the slope of this demand curve. **SHOW THE EQUATION AND ALL OF YOUR WORK !!!! (10 points)**

5. **TO SAVE TIME, YOU MAY FILL IN THE TABLE BELOW.**

You are going into the shotgun shell reloading business. You are trying to determine how many employees to hire to work the loading machine at a wage rate of \$6.00 per hour. Therefore, the control variable is the number of employees. Components (shell casing, primer, wads, shot, and powder) will cost \$3.00 per box. There are no fixed costs (overhead). You can sell every box of shells you reload for \$5.00 per box. You get five friends to come over just before dove season to load some shells, and help you with some economic research. After some initial training on the reloading machine, you first let one friend reload for an hour, and count the number of shells loaded. Then you let two friends reload for an hour, and so on until all five friends are working at the reloading machine, each having a specific task to perform. The results are below.

| Employees | Change in Quantity of Control Variable | Boxes loaded per hour | Total Revenue | Marginal Revenue | Total Cost | Marginal Cost |
|-----------|--|-----------------------|---------------|------------------|------------|---------------|
| 1 | | 15 | _____ | | \$_____ | |
| 2 | _____ | 35 | _____ | _____ | \$ 117 | _____ |
| 3 | _____ | 51 | _____ | _____ | \$_____ | _____ |
| 4 | _____ | 55 | _____ | _____ | \$_____ | _____ |
| 5 | _____ | 57 | _____ | _____ | \$_____ | _____ |

You must have correct answers in the table above to get credit for a, b, and c below! In other words, guessing won't cut it.

- Using marginal analysis, how many employees should you hire to maximize profits ? **(10 points)**
- Suppose you hire the profit maximizing number of employees, and begin production. A high school student from down the road comes to you and asks for a job after school. He/she is a fine young person and you want to help him/her out. What is the maximum wage rate per hour you could pay this student, and not diminish your profits from the current level ? (This is tricky, THINK!) **(10 points)**

BONUS QUESTIONS:

1. Lately, American and Japanese made automobiles have been getting larger, with more powerful, higher performance engines.

On your answer sheet, set up two equations for economic efficiency as follows:

$$\text{E.E. 1973} = \frac{12 \text{ miles}}{1 \text{ gallon gas}} \times \frac{\$1.00 \text{ per mile}}{\text{price of gas in 1973 from question \#2}} = \text{????????????}$$

$$\text{E.E. 1995} = \frac{12 \text{ miles}}{1 \text{ gallon gas}} \times \frac{\$1.00 \text{ per mile}}{\text{From question \#2, what did the real price of gas do from 1973 to 1997?}} = < \text{ or } > \text{ E.E. 1973}$$

- a. What was the economic efficiency of gasoline for a vehicle getting 12 miles per gallon in 1973? What happened to the economic efficiency of gasoline for a vehicle getting 12 miles per gallon of gasoline in 1997? **(10 points)**
- b. Using your calculations above, please **EXPLAIN** why consumers are **NOT** as concerned about the gas mileage of their vehicles today as they were in 1973, and why automobile producers are producing larger, more powerful, less fuel efficient vehicles today relative to the automobiles produced between the mid-seventies and mid- eighties. **(10 points)**

2. TO SAVE TIME, YOU MAY FILL IN THE TABLE BELOW .

The data below are derived from feed trials with broilers (chickens). Physical efficiency is the pounds gained per pound of feed consumed as the birds age from one week to the next. For example, the physical efficiency is .71 as we feed the birds from week 1 to week 2; .61 as we feed the birds from week 2 to week 3. As the birds age, they become less efficient in converting feed to chicken meat.

| WEEK | PHYSICAL EFFICIENCY (pounds gained per pound of feed consumed) | ECONOMIC EFFICIENCY $P_{\text{Broiler}} = \$.45/\text{lb.}$ $P_{\text{feed}} = \$.10/\text{lb.}$ |
|------|--|---|
| 1 | 0.71 | _____ |
| 2 | 0.61 | _____ |
| 3 | 0.57 | _____ |
| 4 | 0.53 | _____ |
| 5 | 0.45 | _____ |
| 6 | 0.37 | _____ |
| 7 | 0.35 | _____ |
| 8 | 0.31 | _____ |
| 9 | | _____ |

- Compute the ECONOMIC EFFICIENCY of feed when broiler price is \$.45 per pound and feed costs are \$.10 per pound, for the weeks indicated and record in the table above. **(10 points)**
- How many weeks should the broilers be fed in order to maximize profits with respect to feed? **(10 points)**
No guessing! You must calculate the Economic Efficiency correctly in the table above in order to get credit.

Something to Think About

Folks, this is not part of the exam (it may be part of a future exam though), but this is where we will be heading in the future. If you know anything about a computer spreadsheet, you should immediately recognize that “c” and “d” below are tailor made applications of spreadsheet technology.

c. You have been assigned as an Assistant Production Manager for Cluck Cluck Poultry Inc, a large integrated broiler firm. Your duties are to determine the optimum (profit maximizing) weeks on feed for birds just placed on several contract growing operations. The current wholesale price for broilers is \$.30 per pound, but corporate economists have estimated that the price may increase to \$.34 per pound in the next few weeks due to national demand and supply estimates just released from USDA. Your boss, the Production Manager, wants you to determine the optimum length to feed the birds just placed, based on the current broiler price, and the forecast future broiler price. Your boss needs this information for planning future production schedules for these contract growers, and must give the Processing Manager some idea of when to expect delivery of these birds at the processing plant. Feed costs are currently \$240 per ton (or \$.12 per pound). Do it!

d. A memo has just come in from the Feed Mill Manager. Corn and soybean meal prices have fallen. The Feed Mill Manager has just purchased several rail car loads of these feedstuffs at the lower price. The Feed Mill Manager has determined that the new price of feed for broiler production will be \$200 per ton for deliveries beginning tomorrow. Your boss has just come to you with this memo and asks you to recalculate the optimum length to feed the birds at the two broiler prices previously specified given this new input price. Get to work, he/she needs it yesterday.

Do you think you should learn how to use a spreadsheet?

Folks, I wish I could teach you everything you should know to be ready for the “real world”, but I cannot. We just do not have the time. Heck, many of you are griping at how much I insist on you using a computer now! Find below a recent employment opportunity for a masters level graduate:

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Agricultural Economist -
Employer Royster-Clark, Inc.
Location Tarboro, NC
Salary not stated

Duties Entry level professional position. Assist top management with analysis and planning with emphases on the changing needs of the agricultural sector, trends monitoring, and the impact of new technologies on farm economics. Skills in the area of distribution economics, accounting, operation analysis and planning will be an important plus. **Strong PC skills are an absolute requirement.**

Contact Send cover letter, resume & salary requirements to Royster- Clark, Inc., Human Resources, PO Box 250, Tarboro, NC 27886
Phone 919/823-1201
Date Posted 10-17-95

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You will be seeing more and more of **Strong PC skills are an absolute requirement.**