

Test 2
Economics 136 – Human Resources
Spring 2008
Prof. Julian Betts

May 8, 2008

Name: _____

Student ID _____

There are 4 written problems in this test, worth a total of 55 points. Please write neatly. If you place the answer to a question in an odd place, such as the back of the page, please indicate this clearly, for the sake of the graders.

If you use pencil, whiteout, or erasable pen on a question, then that question cannot be regraded. If you do submit your test to a TA for regrading, you must do within the time and other guidelines listed in the syllabus.

SHOW ALL YOUR WORK!

You have 80 minutes. Good luck.

For the graders:

- 1. _____/14
- 2. _____/15
- 3. _____/12
- 4. _____/14
- SUM _____/55

Show all of your work!

STUDENT CONSENT FOR RELEASE OF STUDENT INFORMATION
(Buckley Waiver)
(VOLUNTARY)

I hereby authorize the UCSD Economics Department to return my graded final examination/research paper by placing it in a location accessible to all students in the course. I understand that the return of my examination/research paper as described above may result in disclosure of personally identifiable information, that is not public information as defined in UCSD PPM 160-2, and I hereby consent to the disclosure of such information.

Quarter _____ Course _____ Date _____

Instructor _____

Student ID# _____

Print Name _____

Signature _____

Show all of your work!

1. (14 points) Suppose that you have 5 workers at your firm, and you have discovered that workers 1, 2 and 3, are best suited to working in Sales (S) and workers 4 and 5 are best suited to working in production P. You need exactly three workers in Sales and two workers in Production. Therefore maximum output = $S_1 + S_2 + S_3 + P_4 + P_5$ where each of these terms refers to the value of output contributed in sales (S) or production (P) by the worker indicated by the subscript.

a) Does it sound as if workers in this firm work independently of each other? Explain in a sentence or two. (2 points)

b) In general, as a manager, would you prefer a situation like the one in this question in which you need to assign a given number of workers to each of the two divisions, or one in which you could assign them to whatever division would maximize their productivity? Explain the intuition in your answer. (2 points)

c) Let's back up a few steps, and assume that you have just hired the 5 workers and do not yet know their productivity in each of the two jobs. State the steps you need to take in general to figure out which 3 workers to assign to sales, and which 2 to assign to production. (3)

Show all of your work!

d) List the two methods we have discussed in class of figuring out workers' productivity in various jobs. (2)

e) Prove that if workers are assigned as you state in c), that they must indeed be maximizing revenues at your firm. (5)

Show all of your work!

2) (15 points) Your company sells cellular phone contracts for various mobile phone companies, and you have decided to pay your workers on a commission basis. You want to set wages as follows

$$\text{Wage} = a + bE$$

where a and b are parameters your company will choose and E is worker effort. It turns out from past data that

$$Q = 5E$$

where Q is the number of phone contracts the worker sells. Your firm earns \$12 per phone contract signed.

Unfortunately, there are related costs to each sale. For each cell phone contract sold, your company must pay \$1 in costs of hiring managers to supervise your sales staff. In addition, for each cell phone contract sold, you pay \$8 in advertising and booth rental at the local shopping malls. (**Note that both of these costs are per cell phone contract sold.**)

Assume that because the economy is quite strong right now, workers will agree to work for your company only if they reach utility of at least $U=5$. His or her utility is given by

$$U = \text{Wage} - (1/5)E^3$$

a) Derive the worker's reaction to various wage offers of the form $\text{Wage} = a + bE$. (4)

Show all of your work!

b) Given the knowledge you have gained in part a), what are the profit-maximizing values of a and b that your firm should set? What are optimal effort E^* , production Q , and profits? (7)

Show all of your work!

c) With regard to earnings, is the worker in this question risk averse, risk neutral or risk loving? Explain in a sentence. Write down an example of an alternative utility function in which the person would be far more risk averse than what is stated above. In such an extreme case, what is an advantage of paying fixed salaries relative to paying commissions? (4)

3) (12 points) a) In a sentence or two, define general on the job training and firm-specific on the job training. (2)

Show all of your work!

b) Suppose that your firm provides general training, such that in period 1 new workers' Value Marginal Product is $VMP_1 = \$8$ and in period 2, after training, $VMP_2 = \$12$. Workers work for your firm for at most 2 periods before retiring. If they agree to work for you during period 1 they cannot quit partway through period 1. But in period 2 they can work for whichever firm they please. Their goal is to maximize the sum of lifetime earnings. Your goal at the firm is to maximize the sum of profits.

At present, the going wage for workers is \$9 per period. Derive mathematically the profit-maximizing wages to pay in periods 1 and 2 (W_1 and W_2). Show that workers will want to apply. What are profits per worker over two periods? (6)

c) Given what you found profits per worker to be in answer b), how are other firms likely to react over time? How do you expect the alternative wage of \$9, and W_1 and W_2 to change over time? (Assume that firms compete in a perfectly competitive market.) (4)

Show all of your work!

4. (13 points) A person aims to maximize the present discounted value of lifetime earnings over two periods. In period 1 she can either work or go to college and in period 2 she will work. In period 1, if she attends college, she does not work at all, while paying college fees of $\$F$. After finishing college, she earns $\$TA$ where A is the worker's innate ability, and $T > 1$ is a parameter that reflects the economic payoff to attending college for a worker of ability A .

This worker discounts period 2 earnings at a discount rate of r .

Suppose that if she does not attend college in period 1 then she will earn a fixed salary of $\$A$ in both periods 1 and 2.

a) Calculate the PDV of earnings conditional upon attending college and not attending college, which you can label PDV_C and PDV_{none} respectively. (4)

c) Write down a rule that determines whether this student will attend college. Show your work. (Hint: Do not panic if you don't get round numbers.) See if you can express your solution in terms of an inequality involving the Marginal Revenues (MR) from attending college and the Marginal Costs (MC) of attending college. In a sentence or two explain each term of your equations for MR and MC. (5)

Show all of your work!

d) Use calculus to derive the equation for dMR/dA and dMC/DA . Can you determine the sign of both of these derivatives? Given your answer is it clear whether those with higher ability A are more or less likely to attend college compared to those with less ability? Why or why not? (4)