

Problems Set 1
Exercises for Chapters 2 and 3
Economics 152
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1. Suppose that output at your company can be created by using hi or lo skill workers, working independently. Output of each type of worker also depends on how much capital (equipment) you rent for each of them. Output is given by

$$\text{Output} = (2/3)*LK + HK$$

where L= number of LOW skill workers, H = number of high skill workers, and K= units of capital equipment you rent **per worker**. Low skill workers cost \$5 per hour, and high skill workers cost \$9 per hour. You can rent capital for \$1 per hour.

a) Assume that with current technology, K must equal one regardless of which types of workers you hire. Which type of worker should you choose?

b) Illustrate your answer to a) by calculating the equation for isocost lines and the equation for the isoquant with output=8 units per hour, and then graphing the relevant solution. Indicate which is the optimal type of hiring clearly.

c) Suppose that a new technology comes along that now allows you to rent 8 units of capital **per worker** i.e. K=8. Which type(s) of workers should you hire now?

d) Suppose that you have signed a long term contract with the government that requires you to produce 8 units of output per hour, at a price of \$10 each. Which technology, the one you studied in a) or c) will maximize your profits per hour that the factory is open?

2. A firm can hire worker A or worker B, paying each 100K/ yr. Both workers are 63 and will work for 2 years before retiring. Worker A brings in 105K for certain. Worker B brings in 200K with prob .1 and loses 100K with prob .9. If you can fire workers after 1 year, should you hire A or B? Explain. How and why does this result differ from the exercise in class (in which workers could work for 40 years)?

3. Let $Y=Q_{hs}Q_c^2$ be a firm's production function, given inputs of college-educated workers and high school educated workers. Suppose wages are $W_c=10$ and $W_{hs}=5$ for high school and college educated workers, respectively. Will the firm use all high school grads, all college grads or some combination of the two? Specifically, if the firm wants to produce 125 units of output, how many college grads and how many high school grads should it hire? In this production function, are high and low skill workers perfect substitutes?

4. In a few sentences, explain "adverse selection" in hiring—what is it, how does it arise, why is it a problem? Describe some possible strategies firms use to contend with it.

5 Your firm wants to hire only skilled workers (for 2 periods). Workers know their own skill but the firm does not observe workers' skill until after the first period (at which point workers' skill is observed with certainty). In the general labor market, unskilled and skilled workers earn W_u and W_s , respectively. Workers maximize the sum of their wages over the 2 periods. Suppose your firm wants to offer a probation wage, W_1 , in period 1 and a full wage, W_2 , in period 2 that are designed to attract skilled workers and deter unskilled workers. A law is enacted that requires the firm to award severance pay, in the amount of S , to any worker it fires at the end of period 1. Derive W_1 and W_2 in terms of the known quantities W_u , W_s and S .