

QUIZ

Instructions: Write all answers on the separate answer sheet. Make sure you write your name on this answer sheet. (68 points total)

Multiple Choice (12 points)

Instructions: For each multiple choice question, write the letter corresponding to the ONE best answer on the separate answer sheet.

1) (4 points) Which of these factors would shift the labor demand curve out (increase labor demand)?

- a) Decrease in immigration into the United States.
- b) Increase in immigration into the United States
- c) Price of output good increases (labor is used to make this output).
- d) Price of output good decreases (labor is used to make this output).

2) (4 points) If the marginal revenue product of labor is greater than the wage rate ($MRP_h > w$), what should a profit maximizing firm in a competitive labor market do?

- a) Nothing. This is the profit maximizing point.
- b) Hire less labor.
- c) Hire more labor.
- d) Increase the wage rate.
- e) Decrease the wage rate.

3) (4 points) If the elasticity of labor demand with respect to wages is -3 ($\epsilon = -3$), what is the effect on labor demand of a 10 percent increase in the equilibrium wage rate.

- a) No effect on labor demand.
- b) Labor demand increases by 10 percent.
- c) Labor demand decreases by 10 percent.
- d) Labor demand decreases by more than 10 percent.
- e) Labor demand decreases by less than 10 percent.

4) Labor Supply and Demand Graph (23 points)

a) (8 points) Draw the following labor supply and demand curves in one graph. Label each axis, each curve, the equilibrium labor hours employed (h^*), and the equilibrium wage rate (w^*).

Labor Demand Curve:

$$h = 4 - \frac{1}{2}w$$

Labor Supply Curve:

$$h = -1 + \frac{1}{2}w$$

b) (6 points) Calculate the equilibrium wage rate (w^*) and the equilibrium number of labor hours employed (h^*) in this market.

c) (3 points) In your graph, draw a minimum wage at $w' = \$7$. In the graph, indicate the new equilibrium number of labor hours employed (h').

d) (6 points) Under the minimum wage of $w' = \$7$, calculate the new equilibrium amount of labor employed (h') and the new equilibrium wage rate (w').

5) Labor Demand (33 points)

Assume the production function is

$$q = f(h, k) = 2h^{1/2}$$

a) (4 points) What is the marginal product of labor (MP_h)?

b) (4 points) What is the marginal product of capital (MP_k)?

c) (8 points) Assume $p = 2$, $w = 1/2$, and $r = 3$. Calculate the profit maximizing level of labor demand (h^*).

d) (6 points) If w increases to $w = 3$ (and p and r stay at $p = 2$ and $r = 3$), what is the new profit maximizing level of labor demand?

e) (6 points) Calculate the labor demand elasticity with respect to wages (ϵ). (Note: your answer should be a function of h^* , w , and p).

f) (5 points) What is the labor demand elasticity at $w = 3$, $r = 3$, and $p = 2$? (Note: your answer should be a number, not a function.)

Answer to Quiz, Fall 2005

1) c

2) c

3) d

4)

a) Graph

b) $h^* = 3/2$, $w^* = 5$

c) Graph

d) $w' = 7$, $h' = 1/2$

5)

a) $MP_h = h^{-1/2}$

b) $MP_k = 0$

c) $h^* = 16$, $h^* = \frac{p^2}{w^2}$

d) $h^* = 4/9$

e) $\epsilon = \frac{-2p^2}{w^2 h^*}$

f) $\epsilon = -2$

First Midterm, Labor Economics, Fall 2005, Wiswall

Instructions: Write all answers on the separate answer sheet (s). Make sure you write your name on each page of your answer sheets. (57 total points)

Short Answer

Instructions: For each question, write a brief response on the separate answer sheet. Your answers should be concise and direct. Your answers should be no more than 3 sentences.

- 1) What is the BENEFIT to low wage workers (workers whose wage is near the minimum wage) of raising the minimum wage? (5 points)
- 2) What is the COST to low wage workers of raising the minimum wage? (5 points)
- 3) Would the employment effect of a minimum wage be larger or smaller if the labor demand elasticity with respect to wages is elastic ($\epsilon < -1$)? Briefly explain. (5 points)
- 4) Briefly explain the backward bending labor supply curve. (5 points)
- 5) If our objective is to increase the labor supply of low wage workers, explain briefly why we would prefer an EITC-like welfare program over a take-it-or-leave-it cash grant welfare program. (5 points)

Problems

Instructions: For each problem, write your answer on the separate answer sheet. Show at least some work for each problem.

6) Assume the production function for a firm is

$$f(h, k) = 4k^{1/2} + 2h^{1/2}$$

a) What is the firm's profit maximizing level of labor demand h^* as a function of output price p and input prices r and w ? (Your answer should be a function.) (5 points)

b) Assume $p = 1$, $w = 2$, and $r = 3$. Calculate the firm's profit maximizing level of labor demand. (Your answer should be a number.) (5 points)

7) Assume an individual has a utility function of this form

$$u(c, l) = 2cl$$

The individual has an endowment of V in non-labor income and T hours to either work (h) or use for leisure (l).

a) What is the marginal utility of leisure (MU_l)? (Your answer should be a function.) (3 points)

b) Assume $p = 2$, $w = 1$, $T = 16$, and $V = 12$. What is the optimal labor supply of this individual h^* ? (Your answer should be a number.) (8 points)

c) Assume $p = 2$, $w = 1$, $T = 16$, and $V = 12$. What is the optimal consumption of consumer goods c^* ? (Your answer should be a number.) (5 points)

d) Assume $p = 2$, $w = 1$, $T = 16$, and $V = 12$. What is the elasticity of labor supply with respect to wages (γ)? (Your answer should be a number.) (6 points)

Answers to First Midterm, Fall 2005

1)

A minimum wage increases the wage rate of low wage workers.

2)

A minimum wage decreases labor demand (employment). Some low wage workers would not be able to find a job.

3)

Larger. The higher the labor demand elasticity (in absolute value), the more responsive firms are to changes in equilibrium wage rates.

4)

Over some range of wage rates, the substitution effect dominates and higher wages increase labor supply. Over another range of wage rates, the income effect dominates and higher wages decrease labor supply.

5)

An EITC-like program increases the effective wage rate individuals face. This generally encourages higher labor supply (if the substitution effect dominates the income effect). In contrast, a cash grant welfare program can decrease labor supply through an income effect.

Problems

6) Assume the production function for a firm is

$$f(h, k) = 4k^{1/2} + 2h^{1/2}$$

a) What is the firm's profit maximizing level of labor demand h^* as a function of output price p and input prices r and w ? (Your answer should be a function.)

$$MRP_h = w$$

$$ph^{-1/2} = w$$

$$h^* = \frac{p^2}{w^2}$$

b) Assume $p = 1$, $w = 2$, and $r = 3$. Calculate the firm's profit maximizing level of labor demand. (Your answer should be a number.)

$$h^* = \frac{1^2}{2^2} = 1/4$$

7) Assume an individual has a utility function of this form

$$u(c, l) = 2cl$$

The individual has an endowment of V in non-labor income and T hours to either work (h) or use for leisure (l).

a) What is the marginal utility of leisure (MU_l)? (Your answer should be a function.)

$$MU_l = 2c$$

b) Assume $p = 2$, $w = 1$, $T = 16$, and $V = 12$. What is the optimal labor supply of this individual (h^*)? (Your answer should be number.)

$$MRS = \frac{w}{p}$$

$$\frac{2c}{2l} = \frac{w}{p}$$

$$\frac{1}{l} = \frac{w}{pc}$$

$$l = \frac{pc}{w}$$

$$c = V/p + w/p(T - l)$$

$$l = \frac{V + w(T - l)}{w}$$

$$l = V/w + T - l$$

$$l^* = 1/2(V/w + T)$$

$$h^* = T - l^* = 16 - 1/2(12/1 + 16) = 16 - 14 = 2$$

c) Assume $p = 2$, $w = 1$, $T = 16$, and $V = 12$. How many consumer goods can this individual purchase? (Your answer should be a number.)

$$c^* = V/p + w/ph^* = 12/2 + 1/2 * 2 = 7$$

To make sure we have the right answers, you can quickly check these conditions:

i)

$$MRS = \frac{c}{l} = \frac{7}{16-2} = 1/2 = \frac{w}{p} = 1/2$$

ii)

$$pc = wh + V = 2 * 7 = 1 * 2 + 12$$

iii)

$$T = h + l = 2 + 14$$

d) Assume $p = 2$, $w = 1$, $T = 16$, and $V = 12$. What is the elasticity of labor supply with respect to wages (γ)? (Your answer should be a number.)

$$\gamma = \frac{\partial h^*}{\partial w} \frac{w}{h^*}$$

$$h^* = T - 1/2(V/w + T)$$

$$\frac{\partial h^*}{\partial w} = (-1/2) * (-1) * \frac{V}{w^2}$$

$$\gamma = 1/2 \frac{V}{w^2} \frac{w}{h^*} = 1/2 \frac{V}{w} \frac{1}{h^*} = 1/2 * 12/1 * 1/2 = 3$$

Second Midterm, Labor Economics, Fall 2005, Wiswall

Instructions: Write all answers on the separate answer sheet. Make sure you write your name on every page of your answer sheet. (62 total points)

Short Answer

Instructions: For each question, write a brief response on the separate answer sheet. Your answers should be concise and direct. Your answers should be no more than 3 sentences.

1) Using the concepts in the course, explain why higher oil prices could decrease labor demand. (5 points)

2) If the US economy is in a recession, explain why the measured unemployment rate is under-estimating the actual level of unemployment. (5 points)

3) In 1900, the average wage rate in New York state for a type of labor was much higher than in Kansas. By 2000, the wage rate was about the same. Discuss what could have happened to cause these wage rates to converge. (5 points)

4) Using the model of firm provided training from lecture, explain the following: A firm will provide and pay for general training in computers for an employee if the employee agrees to stay with the firm for at least 5 years.

If the employee does not agree to this 5 year commitment, the firm will still provide the computer training, but the worker must pay for this training herself. (5 points)

5) Assume childhood human capital investments are perfect complements with adult human capital investments. Explain why this would make government subsidies for job training for adults ineffective in increasing the human capital of adults. (5 points)

Problems

Instructions: For each problem, write your answer on the separate answer sheet. Show at least some work for each problem.

6) Assume we change our labor supply model to allow individuals to purchase two consumer goods, c_1 and c_2 , with prices for each good of p_1 and p_2 . Write the new budget constraint. (5 points)

7) Assume an individual earns \$10 today and \$10 tomorrow, what is the present value of her total earnings if her discount rate is $\delta = 0.9$? (5 points)

8) A parent has Q dollars to spend on human capital investments for her child. There are three potential human capital investments the parent can make. The costs of each investment are C_1, C_2, C_3 . The adult human capital production function is given by

$$h = \min\{C_1, C_2, C_3\}.$$

How much of the parent's Q dollars should the parent invest in each of the three human capital investments? (7 points)

9) Assume an individual has a utility function of this form

$$u(c, l) = 12 c l,$$

Assume the individual has an endowment of V in non-labor income and T hours to either work (h) or use for leisure (l).

a) Derive the optimal labor supply choice h^* as a function of V , T , w , and p . (10 points)

b) Assume $T = 16$, $p = 2$, $w = 1$. Find the minimum level of V at which the individual decides to work zero hours (10 points).

**Answers to Second Midterm, Labor Economics, Fall 2005,
Wiswall**

Instructions: Write all answers on the separate answer sheet. Make sure you write your name on every page of your answer sheet. (XX total points

Short Answer

Instructions: For each question, write a brief response on the separate answer sheet. Your answers should be concise and direct. Your answers should be no more than 3 sentences.

1) Using the concepts in the course, explain why higher oil prices could decrease labor demand. (5 points)

If oil is another input in production, higher oil prices reduce labor demand through a scale effect. Higher oil prices increase total costs and the firm decides to reduce demand for all inputs, including labor.

2) If the US economy is in a recession, explain why the measured unemployment rate is under-estimating the actual level of unemployment. (5 points)

During a recession, some unemployed workers may decide to stop looking for jobs. These discouraged workers move from the unemployment to the

out of labor force category. Because the unemployment rate is calculated as unemployed/labor force, the unemployment rate is under-estimated.

3) In 1900, the average wage rate in New York state for a type of labor was much higher than in Kansas. By 2000, the wage rate was about the same. Discuss what could have happened to cause these wage rates to converge.

Two possible factors: either firms moved from New York to Kansas (increasing labor demand in Kansas and decreasing labor demand in New York) and/or workers moved from Kansas to New York (increasing labor supply in New York and decreasing labor supply in Kansas).

4) Using the model of firm provided training from lecture, explain the following: A firm will provide and pay for general training in computers for an employee if the employee agrees to stay with the firm for at least 5 years. If the employee does not agree to this 5 year commitment, the firm will still provide the computer training, but the worker must pay for this training herself. (5 points)

If the firm expects the worker to stay, the return to the investment in general training can, at least partially, be captured by the firm. If the firm expects the worker to leave, the firm has no incentive to invest in general human capital and will only invest in firm specific capital.

5) Assume childhood human capital investments are perfect complements with adult human capital investments. Explain why this would make govern-

ment subsidies for job training for adults ineffective in increasing the human capital of adults. (5 points)

Because childhood and adult human capital are perfect complements, low levels of childhood human capital cannot be compensated for by adult investments in human capital. Any additional adult human capital is simply wasted without an equivalent prior amount of childhood human capital.

Problems

Instructions: For each problem, write your answer on the separate answer sheet. Show at least some work for each problem.

6) Assume we change our labor supply model to allow individuals to purchase two consumer goods, c_1 and c_2 , with prices for each good of p_1 and p_2 . Write the new budget constraint. (5 points)

$$p_1c_1 + p_2c_2 = V + w * h$$

7) Assume an individual earns \$10 today and \$10 tomorrow, what is the present value of her total earnings if her discount rate is $\delta = 0.9$? (5 points)

$$PV = 10 + 0.9 * 10 = 19$$

8) A parent has Q dollars to spend on human capital investments for her child. There are three potential human capital investments the parent can make. The costs of each investment are C_1, C_2, C_3 . The adult human capital production function is given by

$$h = \min\{C_1, C_2, C_3\}.$$

How much of the parent's Q dollars should the parent invest in each of the three human capital investments? (7 points)

Because this production function is perfect complements, the amount of the investment should be spread equally among the 3 types of human capital: $C_1 = Q/3, C_2 = Q/3, C_3 = Q/3$.

9) Assume an individual has a utility function of this form

$$u(c, l) = 12 c l,$$

Assume the individual has an endowment of V in non-labor income and T hours to either work (h) or use for leisure (l).

a) Derive the optimal labor supply choice h^* as a function of V, T, w , and p . (10 points)

$$MRS = \frac{12c}{12l} = \frac{w}{p}$$

$$l = \frac{pc}{w}$$

$$pc = V + w(T - l)$$

$$l = \frac{V + w(T - l)}{w}$$

$$l = V/w + (T - l)$$

$$2l = V/w + T$$

$$l^* = \frac{V/w + T}{2}$$

$$h^* = T - \frac{V/w + T}{2}$$

b) Assume $T = 16$, $p = 2$, $w = 1$. Find the minimum level of V at which the individual decides to work zero hours (10 points).

Set h^* to zero and give V dollars in non-labor income:

$$0 = 16 - \frac{V/1 + 16}{2}$$

$$\frac{V/1 + 16}{2} = 16$$

$$V/2 + 8 = 16$$

$$V/2 = 8$$

$$V = 16$$

Final Exam, Labor Economics, Fall 2005, Wiswall

Instructions: Write all answers on the separate answer sheet. Make sure you write your name on every page of your answer sheet. The points for each problem indicate how much time you should spend on each problem. (14 questions, 116 total points)

Short Answer

Instructions: For each question, write a brief response on the separate answer sheet. Your answers should be concise and direct.

1) Assume I collect data on hourly wages from five professors in the NYU Dept. of Economics (I ask each professor their hourly wage). Explain why this data is NOT a random sample for the entire US adult population. Will the mean hourly wage I calculate from my data sample be an unbiased estimator of the unknown population mean for the US adult population? Explain. (7 points)

2) In this course, we discussed several theories of why people are paid different wage rates. Explain 3 independent reasons or models why people are paid different wage rates. (9 points)

3) Define the labor supply elasticity with respect to the wage rate γ (i.e. write down the equation γ). In words, discuss what it means. (5 points)

4) In words, describe the difference between the income and substitution effects for labor supply. (5 points)

5) Explain self-selection bias in the OLS estimator of the “return” to schooling. Discuss 2 independent methods to solve this problem and the advantages and disadvantages of each method. (9 points)

6) Define the piece rate system of paying workers. What are the advantages and disadvantages of this system relative to paying workers by the hour. (7 points)

7) Explain why individuals with high discount rates would be more likely to attend college. (4 points)

8) Define the tournament system of paying workers. What are advantages and disadvantages of this system relative to paying workers by the hour? (7 points)

9) Why would unions be more likely to obtain higher wages from monopolist firms (the firms are a monopoly in the product or output market)? (5 points)

10) In the United States, what was the gender gap in earnings (measured by G_{wm}) in 2000? What was this gender gap in the 1960s? Explain why this gender gap may not be entirely due to gender discrimination in the labor market. Provide one reason why the gender gap declined over time. (10 points)

Problems

Instructions: For each problem, write your answer on the separate answer sheet. Show at least some work for each problem.

11) Assume the production function is

$$q = h^\theta,$$

where q is output and h is labor hours. θ is a parameter between 0 and 1. $0 < \theta < 1$.

What is the optimal labor demand (h^*) as a function of the output price p , the wage rate w , and the parameter θ ? (10 points)

12) Our regression model is

$$\ln W_i = \alpha_0 + \alpha_1 S_i + \alpha_2 e_i + \epsilon_i,$$

where $\ln W_i$ is individual i 's log wage, S_i is years of schooling, e_i is years of labor market experience (number of years the person has worked). α_0 , α_1 , and α_2 are population parameters.

We estimate this regression model using OLS. Here are the parameter estimates (standard errors in parentheses):

$$\hat{\alpha}_0 = 1 \text{ (0.4)}$$

$$\hat{\alpha}_1 = 0.05 \text{ (0.01)}$$

$$\hat{\alpha}_2 = 0.02 \text{ (0.04)}$$

- a) What is the “return” to schooling (as a percent)? (3 points)

- b) What is the “return” to labor market experience (as a percent)? (3 points)

- c) Construct the 95 percent confidence interval for α_1 . (Assume the critical value for this confidence interval is 2). (4 points)

- d) Construct the 95 percent confidence interval for α_2 . (Assume the critical value for this confidence interval is 2). (4 points)

- e) Can we reject the hypothesis at the 95 percent confidence level that α_2 is 0.03? Explain your answer. (5 points)

13) We have a survey of four people. Each survey respondent reported their hourly wage last week. Here is our data: Person 1: $w_1 = \$4$, Person 2: $w_2 = \$2$, Person 3: $w_3 = \$4$, Person 4: $w_4 = \$2$.

Calculate the following:

- a) sample mean (3 points)

- b) sample variance (3 points)

- c) standard error of the sample mean (4 points)

d) Define the population mean as $E[w] = \mu$. Compute the 95 percent confidence interval for μ . (Assume the critical value for this confidence interval is 2). (4 points)

14) In your opinion, what is the most interesting topic of this course? Explain briefly. (This is a legitimate question—I will be grading your answer.) (5 points)

Final Exam, Labor Economics, Fall 2005, Wiswall

ANSWERS

Instructions: Write all answers on the separate answer sheet. Make sure you write your name on every page of your answer sheet. The points for each problem indicate how much time you should spend on each problem. (14 questions, XX total points)

Short Answer

Instructions: For each question, write a brief response on the separate answer sheet. Your answers should be concise and direct.

1) Assume I collect data on hourly wages from five professors in the NYU Dept. of Economics (I ask each professor their hourly wage). Explain why this data is NOT a random sample for the entire US adult population. Will the mean hourly wage I calculate from my data sample be an unbiased estimator of the unknown population mean for the US adult population? Explain. (7 points)

The sample of NYU professors is not a random sample for the entire population because it includes only individuals from a certain occupation and city. Because the sample is not random, statistics, like the mean wage,

will be biased estimates of the population parameters. It is likely that the sample mean wage for NYU professors is an upwardly biased estimate of the true mean wage in the US adult population.

2) In this course, we discussed several theories of why people are paid different wage rates. Explain 3 independent reasons or models why people are paid different wage rates. (9 points)

i) Human capital. Because human capital can affect worker productivity, people with higher levels of human capital are paid more than others.

ii) Compensating differentials. Some workers are employed at jobs with higher levels of non-pecuniary benefits (e.g. good health insurance) and have lower wages relative to other workers with lower levels of non-pecuniary benefits.

iii) Discrimination. Some people are discriminated against because of taste or statistical discrimination.

3) Define the labor supply elasticity with respect to the wage rate γ (i.e. write down the equation γ). In words, discuss what it means. (5 points)

$$\gamma = \frac{\partial h^*(w, p, V)}{\partial w} \frac{w}{h^*}.$$

The labor supply elasticity indicates the responsiveness of individual labor supply decisions to changes in wage rates. It can be negative (income effect dominates) or positive (substitution effect dominates).

4) In words, describe the difference between the income and substitution effects for labor supply. (5 points)

The income effect means that workers work less as wage rates increase. Higher wages makes workers “wealthier” and they decide to consume more leisure by working less.

The substitution effect means that workers work more as wage rates increase. Higher wages increase the price of leisure and workers substitute toward consumption of consumer goods and away from working.

5) Explain self-selection bias in the OLS estimator of the “return” to schooling. Discuss 2 independent methods to solve this problem and the advantages and disadvantages of each method. (9 points)

The self-selection bias is due to the fact that schooling levels are not randomly assigned, but instead are chosen by individuals. Individuals with more years of schooling likely have higher levels of unmeasured human capital (ability). If ability also affects wages, schooling is an endogenous variable. This is a violation of the neo-classical regression model assumption that ε is independent of schooling. The OLS estimator is therefore biased (upward).

We discussed 5 different possible solutions to the bias:

Possible Solution 1: Conduct a Controlled Experiment

Possible Solution 2: Measure Omitted Variables

Possible Solution 3: Instrument or Natural Experiment

Possible Solution 4: Use Identical Twins

Possible Solution 5: Model Selection into Schooling

6) Define the piece rate system of paying workers. What are the advantages and disadvantages of this system relative to paying workers by the hour. (7 points)

A piece rate system assigns wages based on output: $w = \alpha + \beta q$.

The advantage of this system is that it may give workers greater incentives to work hard and produce more output. The piece rate system accomplishes this by making the worker a claimant on the returns to output.

There were 3 disadvantages of this system mentioned in lecture: 1) output is hard to measure, especially in team production, 2) the workers may neglect other production tasks (e.g. maintenance in favor of higher output), and 3) if output is highly variable, this system exposes workers to a lot of risk and risk averse workers would be unlikely to work at these jobs.

7) Explain why individuals with high discount rates would be more likely to attend college. (4 points)

People with high discount rates value future utility almost as much as

present utility. If attending college requires consumption to be put-off (patience), then individuals with higher discount rates would be more likely to attend college.

8) Define the tournament system of paying workers. What are advantages and disadvantages of this system relative to paying workers by the hour? (7 points)

A tournament system establishes a very unequal distribution of wages, where entry workers are paid little, but a few top workers are paid a lot. The advantage of this system is that the high wages of the top workers provides a tournament “prize” that will encourage high effort among entry workers. The disadvantages of this system are that it may encourage destructive competition and may only work well where the performance of individuals can be accurately measured.

9) Why would unions be more likely to obtain higher wages from monopolist firms (the firms are a monopoly in the product or output market)? (5 points)

Monopolist firms in the product market may be receiving higher profits or rents relative to firms in a competitive product market. There may be more scope for unions in the monopolist firm to extract part of these excess profits in the form of higher wages.

10) In the United States, what was the gender gap in earnings (measured by \hat{G}_{wm}) in 2000? What was this gender gap in the 1960s? Explain why this gender gap may not be entirely due to gender discrimination in the labor market. Provide one reason why the gender gap declined over time. (10 points)

In 2000, $\hat{G}_{wm} = 0.75$, or women on average earned about 75 percent less than men. In the 1960s, $\hat{G}_{wm} = 0.6$, or women on average earned about 60 percent less than men.

This gap may not be due entirely to discrimination. Men and women may have different human capital levels. The gap in wages may reflect this difference.

The gender gap may have declined over time as women increased their human capital levels. It may have also declined as labor market discrimination lessened.

Problems

Instructions: For each problem, write your answer on the separate answer sheet. Show at least some work for each problem.

11) Assume the production function is

$$q = h^\theta,$$

where q is output and h is labor hours. θ is a parameter between 0 and 1. $0 < \theta < 1$.

What is the optimal labor demand (h^*) as a function of the output price p , the wage rate w , and the parameter θ ? (10 points)

$$MRP_h = w$$

$$p * \theta h^{\theta-1} = w$$

$$h^{\theta-1} = \frac{w}{p\theta}$$

$$h^* = \left(\frac{w}{p\theta}\right)^{\frac{1}{\theta-1}}$$

12) Our regression model is

$$\ln W_i = \alpha_0 + \alpha_1 S_i + \alpha_2 e_i + \epsilon_i,$$

where $\ln W_i$ is individual i 's log wage, S_i is years of schooling, e_i is years of labor market experience (number of years the person has worked). α_0 , α_1 , and α_2 are population parameters.

We estimate this regression model using OLS. Here are the parameter estimates (standard errors in parentheses):

$$\hat{\alpha}_0 = 1 (0.4)$$

$$\hat{\alpha}_1 = 0.05 (0.01)$$

$$\hat{\alpha}_2 = 0.02 (0.04)$$

a) What is the “return” to schooling (as a percent)? (3 points)

$$\hat{\alpha}_1 * 100 \text{ percent} = 5 \text{ percent.}$$

b) What is the “return” to labor market experience (as a percent)? (3 points)

$$\hat{\alpha}_2 * 100 \text{ percent} = 2 \text{ percent.}$$

c) Construct the 95 percent confidence interval for α_1 . (Assume the critical value for this confidence interval is 2). (4 points)

$$0.05 - 0.01 * 2 \leq \alpha_1 \leq 0.05 + 0.01 * 2$$

$$0.03 \leq \alpha_1 \leq 0.07$$

d) Construct the 95 percent confidence interval for α_2 . (Assume the critical value for this confidence interval is 2). (4 points)

$$0.02 - 0.04 * 2 \leq \alpha_2 \leq 0.02 + 0.04 * 2$$

$$-0.06 \leq \alpha_2 \leq 0.1$$

e) Can we reject the hypothesis at the 95 percent confidence level that α_2 is 0.03? Explain your answer. (5 points)

No. We cannot reject the hypothesis at the 95 percent confidence level that $\alpha_2 = 0.03$. 0.03 is in the 95 percent confidence interval constructed in part d).

13) We have a survey of four people. Each survey respondent reported their hourly wage last week. Here is our data: Person 1: $w_1 = \$4$, Person 2: $w_2 = \$2$, Person 3: $w_3 = \$4$, Person 4: $w_4 = \$2$.

Calculate the following:

a) sample mean (3 points)

$$\bar{w} = 1/4(4 + 2 + 4 + 2) = 3$$

b) sample variance (3 points)

$$S_w^2 = 1/4 * (1 + 1 + 1 + 1) = 4/4 = 1$$

c) standard error of the sample mean (4 points)

$$SE(\bar{w}) = \frac{1}{\sqrt{4}} * \sqrt{1} = 1/2$$

d) Define the population mean as $E[w] = \mu$. Compute the 95 percent confidence interval for μ . (Assume the critical value for this confidence interval is 2). (4 points)

With 95 percent probability, μ is lies in this interval:

$$3 - 1/2 * 2 \leq \mu \leq 3 + 1/2 * 2$$

$$2 \leq \mu \leq 4$$

14) In your opinion, what is the most interesting topic of this course? Explain briefly. (This is a legitimate question—I will be grading your answer.) (5 points)