

FINAL EXAMINATION VERSION A

INSTRUCTIONS: This exam is closed-book, closed-notes. Simple calculators are permitted, but graphing calculators, calculators with alphabetical keyboards, computers, wireless devices and mobile phones are NOT permitted. Point values for each question are noted in brackets. Maximum total points are 200.

I. Multiple choice: Please circle the one best answer to each question. [3 pts each, 42 pts total]

(1) Suppose $\ln(W) = 6.9 + 0.09 S$, where W is expressed in dollars and $\ln(\)$ is the natural logarithm.

If S increases by one unit, then

- a. W increases by about \$6.90.
- b. W increases by about 6.9 percent.
- c. W increases by about \$0.09.
- d. W increases by about 9 percent.
- e. W increases by about 0.09 percent.

(2) Consider a cash grant welfare program, where a person is given \$3000 that is reduced by \$0.50 for every \$1.00 of labor earnings. According to economic theory, this program would cause

- a. an increase in labor force participation.
- b. a decrease in consumption.
- c. an increase in work hours by those already working.
- d. a decrease in work hours by those already working.

(3) According to the Hicks-Marshall rules, labor demand by an industry is *more* elastic in the long run,

- a. the greater the elasticity of labor supply.
- b. the greater the capital/labor ratio.
- c. the greater the elasticity of substitution in production.
- d. the greater the level of total output.
- e. all of the above.

(4) Among U.S. states, those states with the highest average wage a century ago have seen the

- a. slowest subsequent wage growth.
- b. fastest subsequent wage growth.
- c. the same wage growth as other states.

(5) A “non-compete” agreement is

- a. an agreement among employers not to compete for workers.
- b. an agreement among workers not to compete for jobs.
- c. an agreement between an employer and a worker that the worker will not work for another employer in the same industry after leaving this job.
- d. an agreement between an employer and a worker to settle disputes amicably.

(6) Perfect inequality implies a Gini coefficient of

- a. negative one.
- b. zero.
- c. one-half.
- d. one.
- e. infinity.

(7) Positive selection of immigrants means

- a. only people who really want to come to the U.S. actually immigrate to the U.S.
- b. immigrants earn more than native workers.
- c. immigrants had higher-than-average skills in their home country.
- d. immigrants earn more in the U.S. than they earned in their home country.

(8) Suppose an employer receives job applications from a blue worker and a green worker with identical education and experience qualifications. If the employer has experienced more frequent quits by blue workers in the past, the employer may offer the job to the green worker. This would be an example of

- a. statistical discrimination.
- b. monopsony wage discrimination.
- c. preference-based employer discrimination.
- d. preference-based employee discrimination.
- e. preference-based customer discrimination.

(9) Employers were prohibited from engaging in “unfair labor practices” and required to bargain with unions chosen by workers in certification elections under the

- a. Norris-LaGuardia Act of 1932.
- b. Wagner Act of 1935.
- c. Taft-Hartley Act of 1947.
- d. Landrum-Griffin Act of 1959.

(10) A “right-to-work” law is a state law that

- a. invalidates the federal minimum wage law.
- b. outlaws unions.
- c. allows workers to opt out of joining unions and paying union dues.
- d. requires companies bidding on government contracts to pay “prevailing” union wages.

(11) A compensation scheme where workers are paid according to the rank order of their output is called, in economics,

- a. a piece rate.
- b. an efficiency wage.
- c. a tournament.
- d. a profit-sharing plan.

(12) Which pay scheme can inadvertently lead to deterioration in product quality as workers focus on speed?

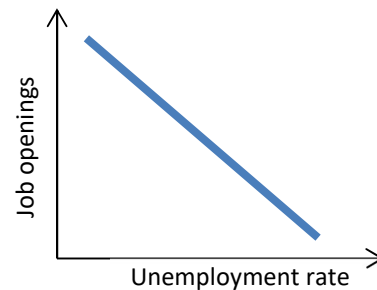
- a. Piece rates.
- b. Time rates.
- c. Delayed compensation.
- d. Efficiency wages.

(13) If job openings decrease because of a recession, this is called

- a. frictional unemployment.
- b. seasonal unemployment.
- c. structural unemployment.
- d. cyclical unemployment.

(14) The diagram below shows the unemployment-vacancies curve (sometimes called the Beveridge curve). During a recession,

- a. the economy moves along the curve, up and to the left.
- b. the economy moves along the curve, down and to the right.
- c. the whole curve shifts up and to the right.
- d. the whole curve shifts down and to the left.



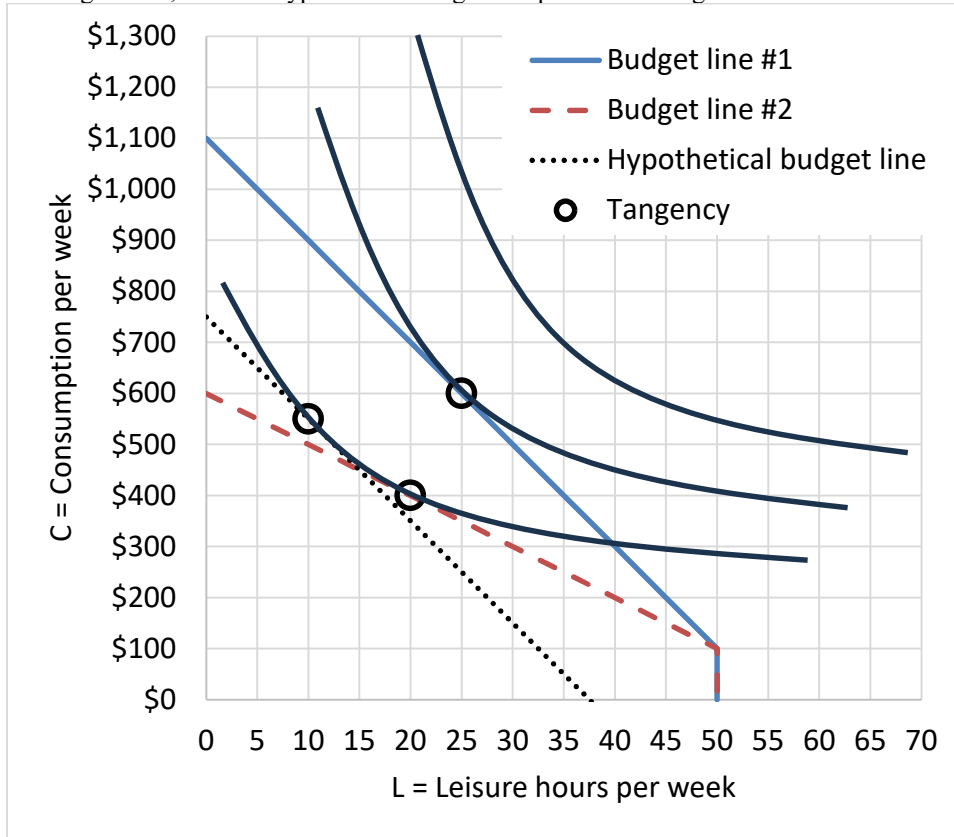
II. Problems: Please insert your answer to each question in the box provided. You may use margins and graphs for scratch work. Only the answers in the boxes will be graded.

(1) [Elasticity of labor demand: 8 pts] Suppose the demand for package sorters in Des Moines has an elasticity of -0.2. Now suppose an increase in the minimum wage raises these workers’ wage by 10 percent, but the demand curve does not shift.

- a. Will the number of jobs for package sorters *increase* or *decrease*?
- b. By about how much?
- c. Will the total income of package sorters (or their wage bill) *increase* or *decrease*?
- d. By about how much?

	%
	%

(2) [Individual labor supply—income and substitution effects: 22 pts] The graph below shows Beth’s indifference curves, two true budget lines, and one hypothetical budget line parallel to budget line #1.



- a. According to this graph, what is Beth’s total available time for work or leisure?
- b. How much nonlabor income does Beth enjoy?
- c. What is Beth’s wage rate on budget line #1?
- d. What is Beth’s wage rate on budget line #2?

	hours
\$	
\$	per hour
\$	per hour

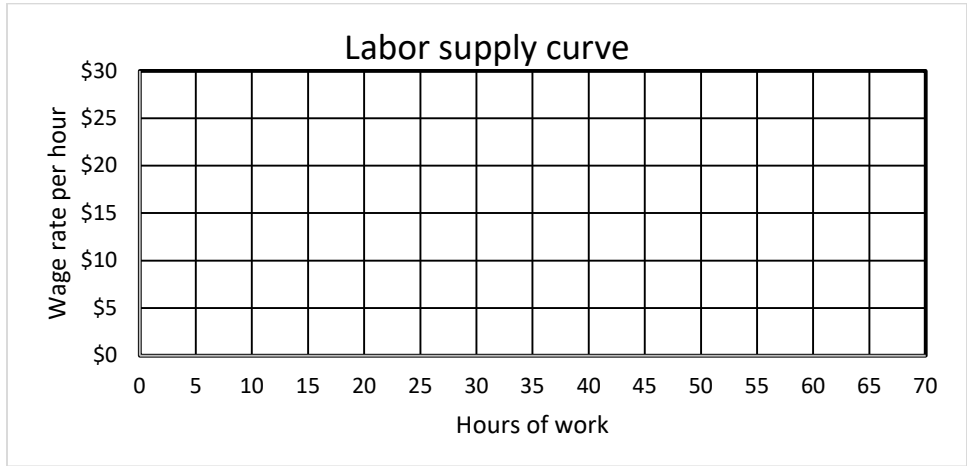
Consider Beth’s response to the change in the wage rate from budget line #1 to budget line #2.

- e. Does the *income effect* of this change cause Beth to work *more* or to work *less*?
- f. Compute the change in hours of work due to the *income effect* alone.
- g. Does the *substitution effect* of this change cause Beth to work *more* or to work *less*?
- h. Compute the change in hours of work due to the *substitution effect* alone.
- i. Does the *total effect* of this change cause Beth to work *more* or to work *less*?
- j. Compute the total change in hours of work caused by the change in the wage rate.

	hours
	hours
	hours
	hours

Question continues on next page.

k. Using the information in this indifference-curve graph, plot two points on Beth's *labor supply curve* in the graph below and sketch the curve.



(3) [SR labor demand: 12 pts] Suppose Acme Manufacturing Company has the following production function.

$$q = 2 (K E)^{1/2} .$$

A little calculus shows that the marginal product of labor is,

$$MP_E = (K/E)^{1/2} .$$

Assume that the price of output is \$30.

a. Give an expression for the value of marginal product of labor. The only unknowns should be K and E.

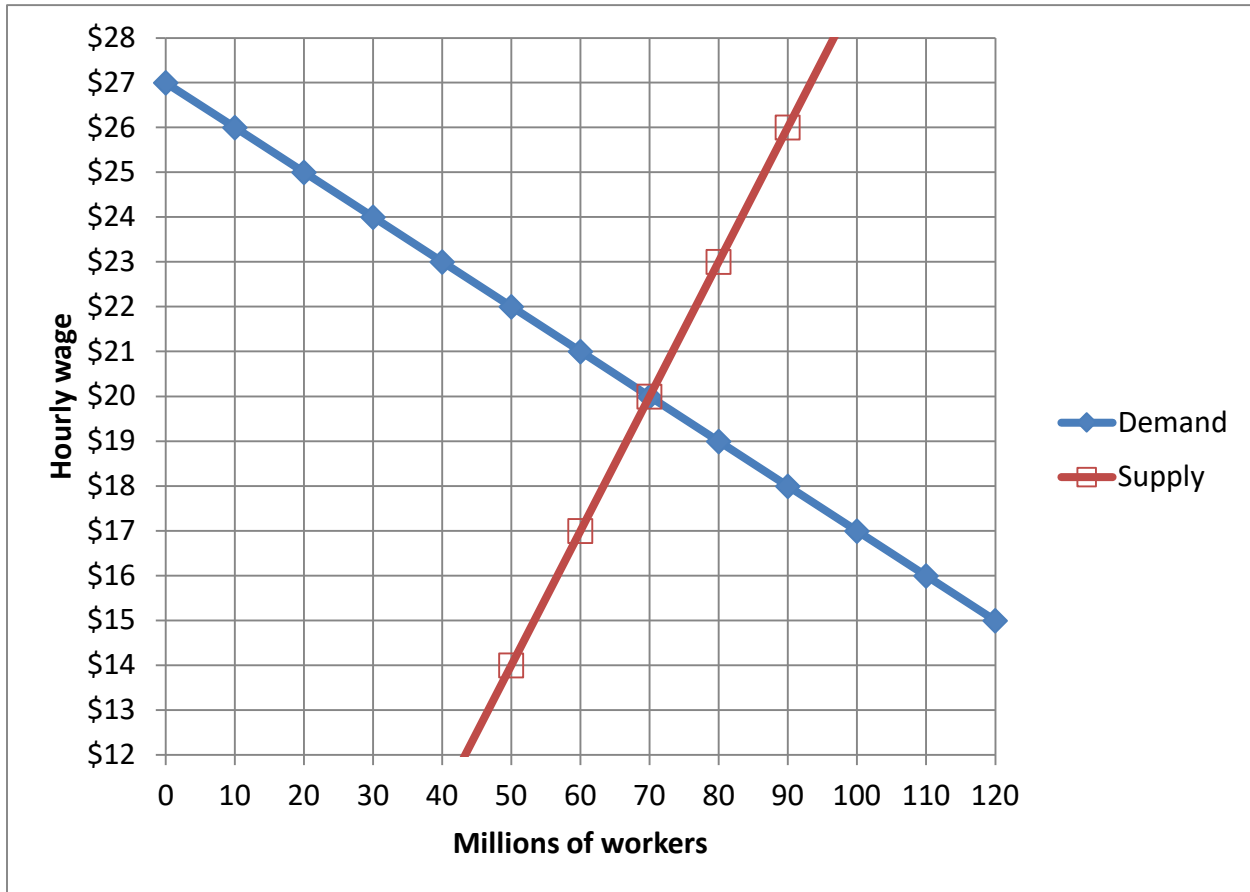
Assume further that the wage is \$20 per hour, the price of capital is \$10, and the capital stock is fixed at K=16 units.

b. How much labor E should Acme employ in the short run?

c. How much output q will Acme produce?

d. How much profit will Acme enjoy?

(4) [Payroll tax or subsidy: 14 pts] The graph below shows demand and supply for workers in a particular labor market.



Suppose the government imposes a **payroll tax of \$4** per hour.

- Find the new level of employment.
- Find the new total labor cost per hour paid by employers (including the tax).
- Find the new net wage per hour received by workers (excluding the tax).
- Compute the loss of employer surplus as a result of the tax (per hour).
- Compute the loss of worker surplus as a result of the tax (per hour).
- Compute the tax revenue collected by the government (per hour).
- Compute the deadweight loss caused by the tax (per hour).

	million
\$	
\$	
\$	million
\$	million
\$	million
\$	million

(5) [VSL, safety regulation: 9 pts] The following regression equation has been fitted to data on a large sample of workers:

$$\text{annual earnings} = -6234 + 4502 S + 980 R$$

where S = total education in years, and R = annual occupational death rate per 10,000 workers.

a. Compute the value of a statistical life implied by these estimates. Show your work and circle your final answer.

Suppose a particular factory employs a large number of workers. A special ventilating system, designed to reduce workers' exposure to noxious fumes, would cost \$100,000 per year. It is estimated that the system would reduce the factory's average annual death rate from 0.7 to 0.5 persons per year.

b. Compute the cost of the system per statistical life saved. Show your work and circle your final answer.

c. Given the numbers you have computed above, should the system be required? Why or why not?

(6) [Simple model of schooling decision: 13 pts] Suppose a person lives for two periods and must choose between two careers. If the person chooses “no college,” the person earns \$50,000 in the first period and then \$50,000 in the second period. If the person chooses “college,” the person earns nothing in the first period and pays college costs of \$30,000, and then earns \$134,000 in the second period.

First, suppose the person’s discount rate between the two periods is $r = 8\%$.

a. [3 pts] Compute the net present value as of the first period of “no college”. Show your work and circle your final answer.

b. [3 pts] Compute the net present value as of the first period of “college.” Show your work and circle your final answer.

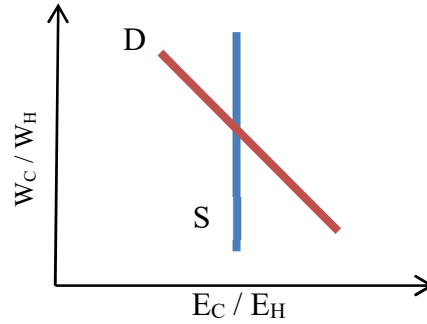
c. [2 pts] Which career will the person choose: “no college” or “college”?

Next, consider the discount rate r^* between the two periods would make the person exactly indifferent between the two careers.

d. [3 pts] Compute r^* . Show your work and circle your final answer.

e. [2 pts] If the person’s discount rate were *less* than r^* (found in part d) would that person choose “no college” or “college”?

(7) [Skill-biased technical change: 8 pts] The graph at right shows short-run demand and supply for college-educated workers *relative* to high-school-educated workers. Here E_C is the number of college-educated workers, E_H is the number of high-school-educated workers, W_C is the average wage of college-educated workers, and W_H is the average wage of high-school-educated workers. As the graph shows, relative supply is perfectly inelastic in the short run because the quantities of workers change slowly.



Suppose the elasticity along the relative demand curve, called the *elasticity of substitution*, is estimated to equal

$$\left| \frac{\% \text{ change } (E_C/E_H)}{\% \text{ change } (W_C/W_H)} \right| = 1.4 .$$

Suppose over a decade, relative supply (E_C/E_H) shifts **right 7%**, as more people attend college.

- a. If nothing else changed, would the relative wage (W_C/W_H) increase or decrease?
- b. By how much?

%

Suppose that in fact, the relative wage (W_C/W_H) **increased by 10%** over the same period.

- c. Should we conclude that the relative demand curve *shifted right* or *shifted left*, or *remained constant*?
- d. By how much?

%

[Hint: $\text{elasticity of substitution} = \frac{\% \text{ shift in relative demand} - \% \text{ shift in relative supply}}{\% \text{ change } (W_C/W_H)} .$]

(8) [Migration decision: 6 pts] A young worker currently resides in City A, earning \$40,000 per year. However, in City B, the same worker can earn \$50,000 per year. Assume for simplicity that there is no difference in the cost of living. Also assume that the worker's discount rate is 10%.

- a. Compute the present discounted value of the young worker's potential stream of earnings in City A. [Hint: Use the approximation formula $\frac{1+r}{r} W$.]
- b. Compute the present discounted value of the young worker's potential stream of earnings in City B. [Hint: Use the same approximation formula.]
- c. Compute the moving cost for the marginal worker, indifferent between moving or not from City A to City B.

\$		thousand
\$		thousand
\$		thousand

(9) [Oaxaca decomposition: 6 pts] Suppose we have computed the following statistics using data on hourly wages (W) and schooling (S) for a large sample of green and blue workers.

	Regression equation	Average years of schooling
Green workers	$\ln(W_G) = 1.2 + 0.10 S_G$	14
Blue workers	$\ln(W_B) = 0.9 + 0.08 S_B$	10

a. Compute the raw log wage differential—that is, $\overline{\ln(W_G)} - \overline{\ln(W_B)}$.

b. Compute the log wage differential due to schooling.

c. Compute the log wage differential due to discrimination in the labor market, in Oaxaca's definition.

(10) [Monopsony wage discrimination: 16 pts] A certain employer enjoys monopsony power over two groups of workers. Supply of green workers to this employer is given by $w_G = 8 + (E_G/30)$. Supply of blue workers to the same employer is given by $w_B = 4 + (E_B/5)$. The value of marginal product of all workers is constant and equal to \$20.

- a. Recall that if labor supply is a straight line, then marginal labor cost is also a straight line, with the same intercept and twice the slope of labor supply. Give the equation for marginal labor cost for each group of workers.

$MLC_G =$	$MLC_B =$
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- b. What level of employment (E_G and E_B) will the employer choose for each group?

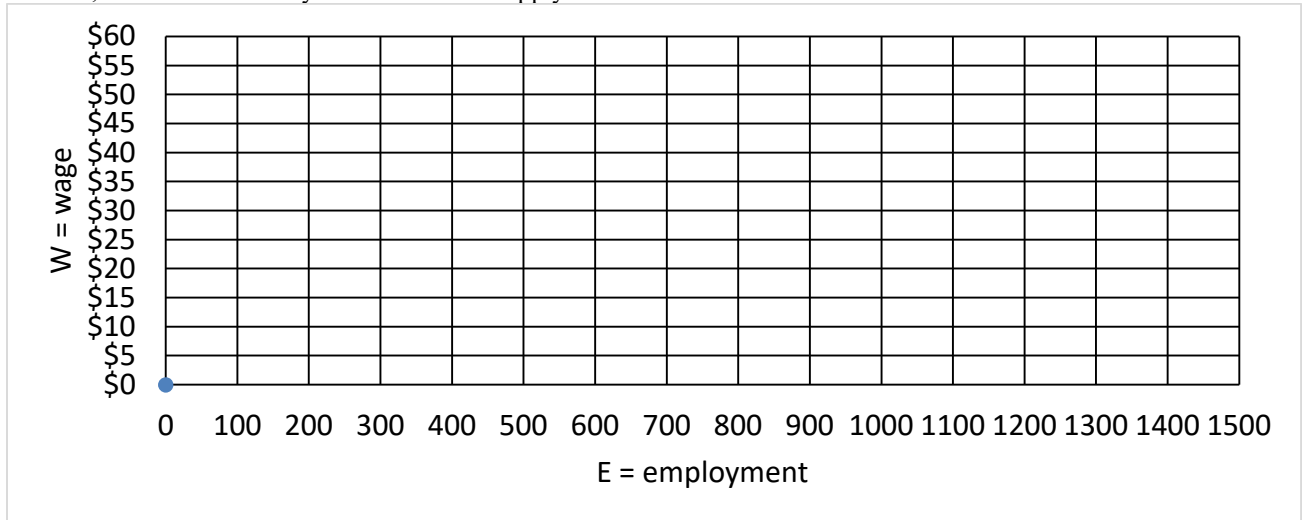
- c. What wage (w_G and w_B) will the employer pay each group?

- d. Suppose the government imposes a minimum wage of \$15 for all workers. Now what level of employment (E_G and E_B) will the employer choose for each group?

(11) [Monopoly unionism: 10 pts] Suppose labor demand (VMP) by a particular firm is given by $W = 60 - 0.05 E$, where W is the hourly wage and E is employment (number of workers). The competitive wage is $W_C = \$20$.

a. Compute the competitive level of employment. Show your work and circle your final answer.

b. Using a straightedge, graph and label the labor demand curve in the graph below. Also plot a horizontal line at W_C , which is effectively the firm's labor supply curve.



Assume the firm faces a monopoly union, whose utility function is given by $U = W \times E$. (This assumption is sometimes called “wage-bill maximization.”) A little calculus shows that the union's marginal utility of employment is $MU_E = W$ and its marginal utility of wages is $MU_W = E$.

c. Compute the wage set by the union and the resulting level of employment. [Hint: Set the union's $MRS = MU_E/MU_W$ equal to the |slope| of the labor demand curve.] Show your work and circle your final answers.

d. Plot this outcome in the graph above and label it “Wage-bill max.”

e. Compute the efficiency loss from this outcome. Circle your final answer.

(12) [Piece rates and time rates: 10 pts] Anna packs items for shipment at two possible employers. Firm #1 pays a piece rate: **\$0.60 per item**. Firm #2 simply pays a time rate of **\$15 per hour** and fires anyone who does not pack at least **20** items per hour.

Anna's marginal cost of effort to pack items is $MC = 0.02 N$, where N is the number of items packed per hour. It can be shown using integral calculus that Anna's total cost of effort per hour is $TC = 0.01 N^2$. Suppose Anna worked at Firm #1.

- a. How many items would she pack per hour?
- b. What would be her hourly pay?
- c. What would be her net benefit at Firm #1 (that is, hourly pay minus total cost of effort per hour).

items
\$
\$

Suppose Anna worked at Firm #2.

- d. What would be her net benefit at Firm #2 (that is, hourly pay minus total cost of effort per hour).
- e. Which employer will Anna prefer?

\$

(13) [Markov model: 10 pts] Suppose people move between employment and unemployment every month according to the following Markov transition matrix. Note that two numbers are missing.

		To	
		Employment	Unemployment
From	Employment	0.97	(a)
	Unemployment	(b)	0.53

- a. What number belongs in place of (a)?
- b. What number belongs in place of (b)?
- c. What percent of employed people lose or leave their jobs or every month?
- d. What percent of unemployed people find jobs every month?
- e. Compute the steady-state unemployment rate.

%	
%	
%	

(14) [Job search: 10 pts] An unemployed worker is searching for a job. Suppose the marginal benefit of further search, as a function of the wage offer in hand, is $MB = 65 - 4W$, and the marginal cost of further search, as a function of the wage offer in hand, is $MC = 5 + W$.

a. What is the worker's reservation wage?

b. Would the worker accept a job at \$15 per hour? Why or why not?

Suppose unemployment insurance benefits were *increased*.

c. Which curve would shift: MB or MC? Why?

d. Would the reservation wage increase or decrease? Why?

e. Would the average time to find a new job increase or decrease? Why?

III. Critical thinking: Write a one-paragraph essay answering one question below (your choice). [4 pts]

(1) Suppose a manager is considering a change in the way she pays her sales workers. Instead of simply paying them by the hour, she is considering paying them according to the number of units they sell in a “tournament” pay scheme. The top-ranked sales worker would get a large bonus, the second-ranked sales worker would get a smaller bonus, and so forth. The manager asks you for advice.

- a. What are the advantages of a “tournament” pay scheme over straight hourly pay?
- b. What is one disadvantage?

(2) Three theories all predict that workers will enjoy higher wages, the longer they stay with their current employer: *delayed compensation*, *specific on-the-job training*, and *general on-the-job training*.

- a. Which of these theories also predict that workers’ productivity (value of marginal product) will be higher, the longer they stay with their current employer? Why?
- b. Which of these theories also predict that workers’ likelihood of quitting for another employer will be lower, the longer they stay with their current employer? Why?

Circle the question you are answering and write your answer below. Full credit requires correct economic reasoning, legible writing, good grammar including complete sentences, and accurate spelling.

[end of exam]