EXAMINATION 2 VERSION A
"Equilibrium and Differences in Pay"
March 27, 2019

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 100.

I. Multiple choice: Please circle the one best answer to each question. [1 pts each, 13 pts total]

(1) A competitive labor market
a.   divides the surplus equally between employers and workers.
b.   maximizes the total surplus.
c.   maximizes employer surplus.
d.   maximizes worker surplus.

(2) Among U.S. states, those states with the lowest 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.

(3) Suppose in a particular labor market, the elasticity of labor supply is 0.1 and the elasticity of labor demand is -0.8. If a payroll tax is enacted,
a.   employers will bear most of the burden.
b.   workers will bear most of the burden.
c.   the burden will be shared equally between workers and employers.
d.   the side of the market that is legally required to pay the tax will bear most of the burden.

(4) 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.

(5) Suppose that low-risk jobs pay $12 per hour and high-risk jobs pay $20 per hour. Then $8 equals
a.   the average reservation price of all workers that chose high-risk jobs.
b.   the average reservation price of all workers that chose low-risk jobs.
c.   the reservation price of the marginal worker indifferent between high or low risk jobs.
d.   the average reservation price of all workers in the labor market.

(6) Consider a diagram with the wage on the vertical axis and risk of injury on the horizontal axis. If for some strange reason workers *preferred* risky jobs to safe jobs, their indifference curves would be
a.   upward-sloping curves.
b.   downward-sloping curves.
c.   upward-sloping 45-degree lines.
d.   vertical lines.
e.   horizontal lines.

(7) Each worker's best choice for a job is at
a.   the intersection between the worker's indifference curve and the hedonic wage function.
b.   a tangency between the worker's indifference curve and the hedonic wage function.
c.   the lowest possible point on the hedonic wage function.
d.   the highest possible point on the hedonic wage function.

(8) Workers' Compensation is a government program that
a. allows workers to sue employers if workers are injured on the job.
b. provides insurance for injured workers.
c. requires employers to pay compensating differentials for risky jobs.
d. All of the above.

(9) Education is similar to physical capital in that
a. workers can be replaced by machines.
b. the cost is born upfront and the returns come later.
c. both are needed for production of goods and services.
d. the best workers "capitalize" on their education.

(10) The higher a person's discount rate, everything else equal,
a. the more education the person will choose.
b. the less education the person will choose.
c. The discount rate has no effect on the amount of education a person will choose.
d. Cannot be determined from information given.

(11) The marginal rate of return to schooling is typically estimated to be roughly
a. zero.
b. 0.02.
c. 0.10.
d. 0.50.

(12) If more-able persons tend to get more education than other persons, then ordinary least squares regression of earnings on schooling will tend to
a. underestimate the returns to schooling.
b. overestimate the returns to schooling.
c. estimate the returns to schooling without bias.
d. Cannot be determined from information given.

(13) According to the model of job-market signaling, in a so-called "separating equilibrium,"
a. employers separate themselves into two groups: high-wage employers and low-wage employers.
b. the pay gap is greater than the cost of education for high-productivity workers, but less than the cost for low-productivity workers.
c. workers' separation rates (that is, their quit and layoff rates) remain constant.
d. each employer separates itself from others through unique pay and benefit offerings.

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) [Mandated benefits: 16 pts] The graph below shows demand and supply for workers in a particular labor market.
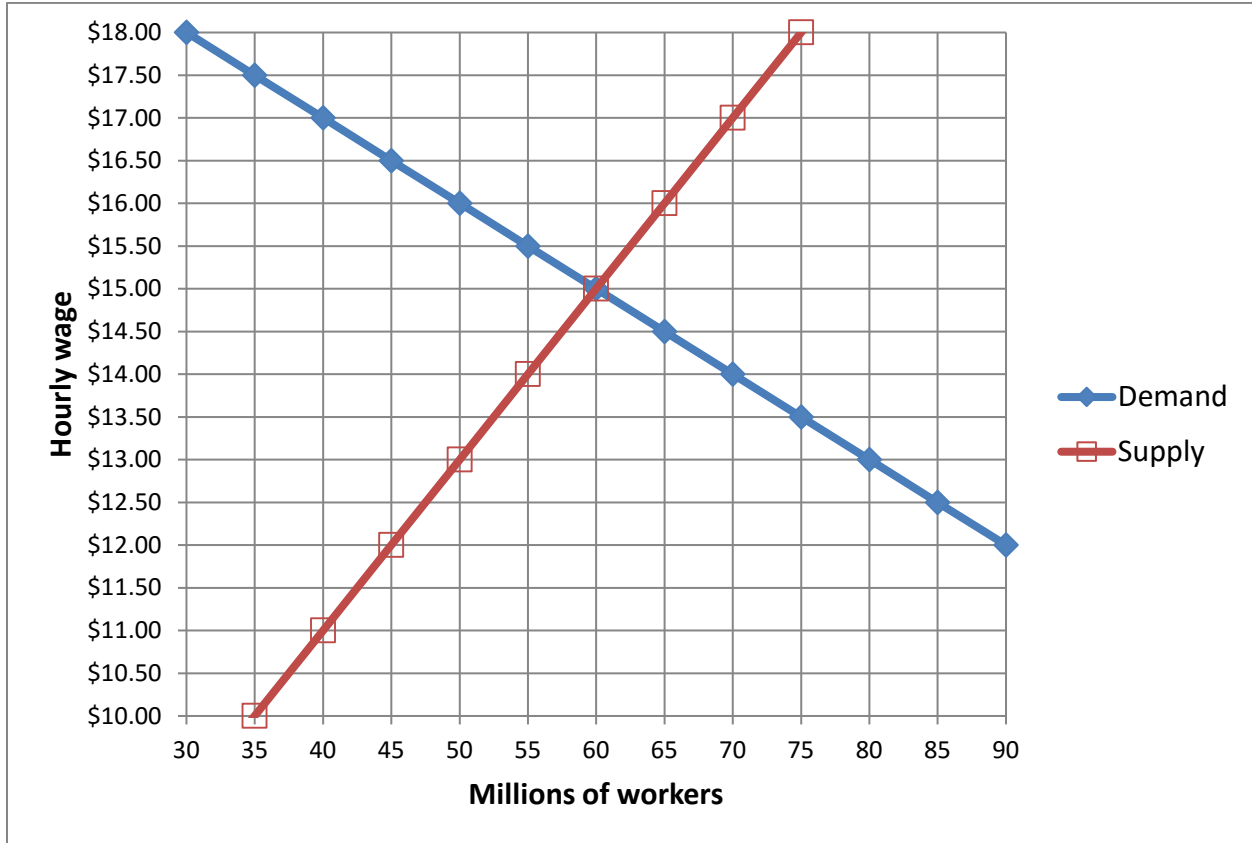
Suppose the government requires employers to provide regular rest breaks for workers. These breaks cost employers $3 per hour in lost output. First assume the breaks are of no value to workers.

a. Which curve shifts: *demand* or *supply* ?

b. Using a straightedge, draw and label the new curve in the graph above.

c. Find the new equilibrium level of employment.

million

d. Find the new equilibrium wage.

$

Second assume the breaks are worth $1.50 per hour to workers.

e. Now which curve shifts: *demand* or *supply* ?

f. Using a straightedge, draw and label the new curve in the graph above.

g. Find the new equilibrium level of employment.

million

h. Find the new equilibrium wage.

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(2) [Monopsony: 18 pts] Suppose a monopsony employer's demand for workers is given by
$$VMP = 40 - (E/10).$$
Labor supply to the employer is given by
$$w = 4 + (E/20).$$

a. [4 pts] Compute the efficient level of employment (E), where the value of the next worker's time equals that worker's contribution to the firm's revenue. Show your work and circle your final answer.

b. [2 pts] 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 (MLC).

$$MLC =$$

c. [4 pts] What level of employment (E) will the employer choose to maximize profit? Show your work and circle your final answer.

d. [4 pts] What wage (w) will the employer pay? Show your work and circle your final answer.

e. [4 pts] Suppose the government imposes a minimum wage of $15 per hour. What level of employment (E) will the employer now choose? Show your work and circle your final answer.

(3) [Gains from migration: 9 pts] Suppose there are two labor markets: North and South. Demand for labor in North is given by $W_N = 20 - (E_N /10),$ where W_N is the annual wage (in thousands of dollars) and E_N is the number of workers (in millions).   Demand for labor in the South is given similarly given by $W_S = 15 - (E_S /5).$ Labor is supplied inelastically to each market. Currently, there are 40 million workers in each market, for a total of 80 million workers.

  a. Compute the current wages in each market. Show your work and circle your final answer.

Suppose workers can migrate costlessly between markets in the long run.

  b. Compute the equilibrium wages and employment levels in each market in the long run. Show your work and circle your final answer.

  c. Compute the total gain in efficiency for the two regions from migration. Show your work and circle your final answer. Show your work and circle your final answer. [Hint: sketch graphs first.]

(4) [Immigration: 4 pts] In the summer of 1980, a large number of relatively unskilled Cubans immigrants arrived in Miami in an event dubbed "the Mariel Boatlift." In a famous article,[1] economist David Card analyzed the impact of that event on the Miami labor market using data from the Current Population Survey. Part of the article compares data for Miami with data for other cities not affected by the Mariel Boatlift. Use these data to estimate the effect of the Mariel Boatlift on wages in Miami, using a difference-in-differences methodology.

	1979	1982
Average wage of African-Americans in Miami	$4.90	$4.39
Average wage of African-Americans in other cities	$5.70	$5.53

(5) [VSL, safety regulation: 6 pts] The following regression equation has been fitted to data on a large sample of workers:

$$\text{annual earnings} \; = \; -7533 \; + \; 3247 \, S \; + \; 943 \, R$$

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 $1 million per year. It is estimated that the system would reduce the factory's average annual death rate from 1.3 to 1.1 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?

[1] Card, D. (1990). The impact of the Mariel Boatlift on the Miami labor market. *Industrial and Labor Relations Review*, *43*(2), 245-257.

(6) [Compensating differential with heterogeneous preferences: 8 pts] Suppose in an economy there are two industries, "Dirty" and "Clean." Suppose demand for labor in the Dirty industry is given by $W_D = 24 - 0.1 \, E_D$ and in the Clean industry is given by $W_C = 18 - 0.1 \, E_C$, where W denotes the wage and E denotes employment. There are **100** workers in the economy. They are all willing to work regardless of the wage, so $E_D + E_C = 100$. (That is, labor is supplied inelastically to the economy as a whole.)

    a. First, suppose workers do not care in which industry they work. Compute the equilibrium values of W_D, W_C, E_D, and E_C. Show your work and circle your final answers.

    b. Second, suppose workers have different preferences—some strongly dislike the Dirty industry while others hardly care. In particular, suppose the supply of workers to the Dirty industry depends positively on the compensating differential: $(W_D - W_C) = 0.2 \, E_D$. Thus the first worker hired by the Dirty industry ($E_D = 1$) requires hardly any differential, but the last potential worker ($E_D = 100$) requires a differential of $20. Again, every one is willing to work, so $E_D + E_C = 100$. Compute the equilibrium values of W_D, W_C, E_D, and E_C. Show your work and circle your final answers.

(7) [Simple model of schooling decision: 16 pts] Suppose a person lives for two periods and must choose between two careers. If the person chooses "no college," the person earns $100,000 in the first period and then $100,000 in the second period. If the person chooses "college," the person earns nothing in the first period and pays college costs of $50,000, and then earns $260,500 in the second period.

First, suppose the person's discount rate between the two periods is **r = 5%.**

   a. [4 pts] Compute the net present value as of the first period of "no college". Show your work and circle your final answer.

   b. [4 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. [4 pts] Compute r*. Show your work and circle your final answer.

   e. [2 pts] If the person's discount rate were *greater* than r* (found in part d) would that person choose "no college" or "college"?

(8) [Who pays for OJT: 6 pts] Suppose that, without training, a computer programmer's value of marginal product is $30,000 per year. If the programmer is trained in the first year, the programmer's value of marginal product rises to $35,000 per year in the second year. However, training costs the employer $5,000. For simplicity, assume the programmer stays with the firm a maximum of two years, and assume the interest rate is zero.

 a. Suppose that this training raises the programmer's value of marginal product at this employer but also at *many other* employers. If the programmer is trained in the first year, what will be the programmer's wage in each year? **Why?** (If there are many possible correct answers, give one.)

 b. Alternatively, suppose that this training raises the programmer's value of marginal product *only* at this particular employer. If the programmer is trained in the first year, what will be the programmer's wage in each year? **Why?** (If there are many possible correct answers, give one.)

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

(1) In 1776, Adam Smith argued that one reason for differences in pay across occupations was "the easiness and cheapness, or the difficulty and expense of learning them."
    a.   What modern theory of wage differentials did Smith anticipate?
    b.   Why do workers earn higher wages if their occupation is more expensive to learn?

(2) Consider workers at a restaurant.
    a.   Give an example of *general training* that the employer might provide and explain why this training is *general*.
    b.   Give an example of *specific training* that the employer might provide and explain why this training is *specific*.

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. Label all curves and axes.

[end of exam]