EXAMINATION 3 VERSION A
"Wage Structure, Mobility, and Discrimination"
April 17, 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 pt each, 11 pts total]

(1) A rising value of the Gini coefficient would imply that
a. average income has increased.
b. average income has decreased.
c. income has become more equal.
d. income has become more unequal.

(2) Since about 1980 in the U.S.,
a. the returns to education have increased.
b. the returns to experience have increased.
c. wage inequality has increased within groups of workers with the same education and experience.
d. all of the above.

(3) Since 1980, the real minimum wage in the United States (that is, the legal minimum wage adjusted for inflation) has
a. increased.
b. decreased.
c. remained roughly constant.
d. been repealed.

(4) Consider a regression line $y = \beta_1 + \beta_2 x + \varepsilon$,
where x denotes parent earnings and y denotes child earnings. If the slope β_2 equals one,
a. the child's earnings are independent of the parent's earnings.
b. the child's earnings exactly equal the population average.
c. there is no intergenerational mobility.
d. the child has no earnings.

(5) A worker is more likely to move,
a. the older the worker is.
b. the more education the worker has.
c. both (a) and (b).
d. neither (a) nor (b).

(6) Sharp restrictions on immigration, with quotas favoring immigrants from Europe, were imposed in the
a. 1920s.
b. 1940s.
c. 1960s.
d. 1980s.

(7) Some people argue that "social capital" has an important effect on earnings. "Social capital" is
a. human capital acquired at public schools.
b. the common education heritage of all citizens.
c. informal learning from role models and peer groups in the neighborhood where one grows up.
d. public infrastructure such as roads, bridges, and public buildings.

(8) The frequency of quits and layoffs
a. increases with job seniority.
b. decreases with job seniority.
c. is not related to job seniority.

(9) Becker's theory of employee discrimination concludes that discrimination
a. decreases wages for the discriminated group.
b. decreases employment for the discriminated group.
c. causes segregation.
d. all of the above.

(10) Becker's theory of customer discrimination predicts labor-market segregation
a. by firm.
b. by job assignment.
c. by plant.
d. by shift.

(11) 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.   preference-based employer discrimination.
b.   preference-based employee discrimination.
c.   preference-based customer discrimination.
d.   statistical discrimination.
e.   monopsony wage discrimination.

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) [Measuring inequality: 15 pts] Suppose the lowest third of workers all have an annual wage of $10 thousand, the middle third all have an annual wage of $60 thousand, and the highest third all have an annual wage of $130 thousand.

| Third	Annual wage	Share of earnings	Cumulative share
Lowest	$10 thousand	%	%
Middle	$60 thousand	%	%
Highest	$130 thousand	%	%

a. [5 pts] Compute the shares and cumulative shares. Check your work carefully.
b. [2 pts] **Using a straightedge,** plot the Lorenz curve for wages in the graph below.
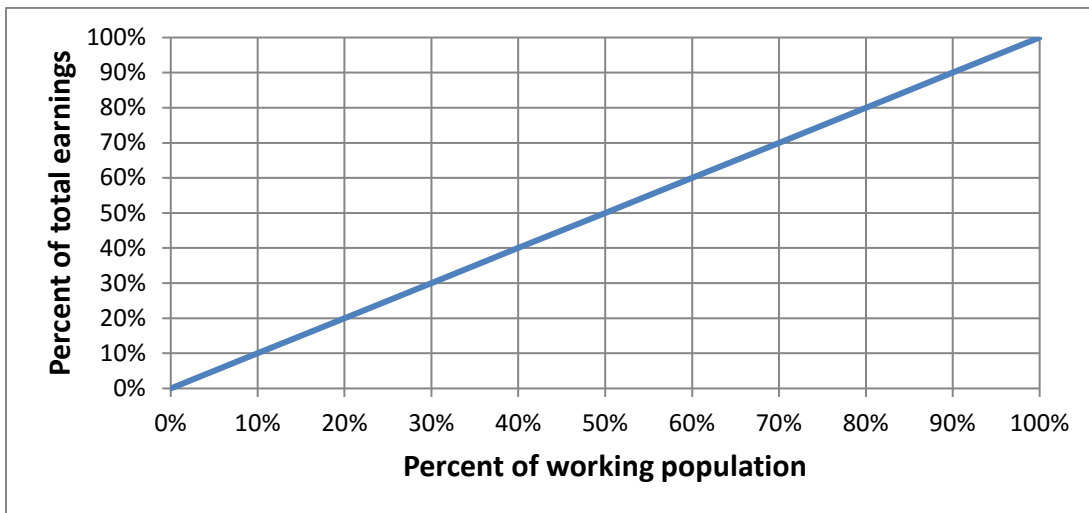
c. [2 pts] Compute the Gini coefficient to three decimal places.

d. [2 pts] Compute the 90-10 wage gap.

e. [2 pts] Compute the 90-50 wage gap.

f. [2 pts] Compute the 50-10 wage gap.

	%
	%
	%

(2) [Shifts in relative supply and demand by skill: 8 pts] The graph below shows 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.
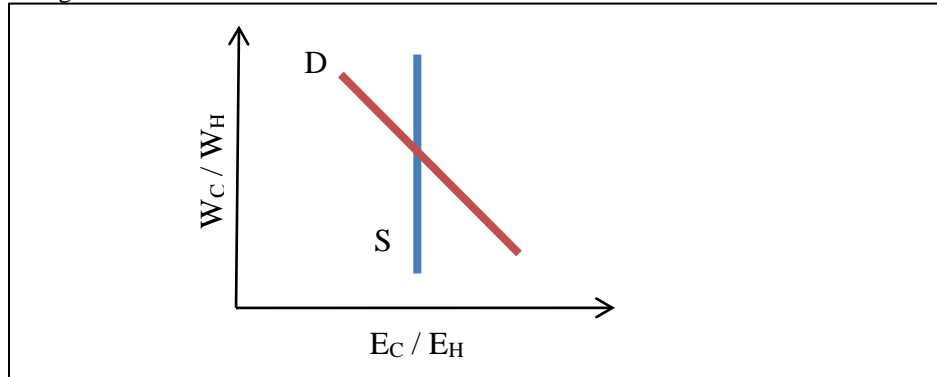
The elasticity along the relative demand curve is called the *elasticity of substitution*, defined as
$$\left| \frac{\% \ change \ (E_C/E_H)}{\% \ change \ (W_C/W_H)} \right| ,$$
and is estimated to be about 1.6. Relative supply, by contrast, is perfectly inelastic in the short run. Now, over time, supply has shifted right as more people attend college. In particular, from 1980 to 2000, (E_C / E_H) increased by 2.28 percent per year.

a. [2 pts] If nothing else changed, would the relative wage (W_C / W_H) increase or decrease?

b. [2 pts] By how much per year? Give an answer to three significant digits.

%

c. [4 pts] In fact, the relative wage (W_C / W_H) increased by 1.04 percent per year over this period. How do you account for this discrepancy?

(3) [Joint migration decision: 6 pts]   Party A and Party B live in Des Moines, but are contemplating a move to Los Angeles. Party A's net present value of earnings in Des Moines is $1,000,000 and net present value of earnings in Los Angeles is also $1,000,000. Party B's net present value of earnings in Des Moines is $800,000 and net present value of earnings in Los Angeles is $1,200,000. Each person's moving cost is $50,000.

a. Assuming Party A and Party B remain together, will they move to Los Angeles? Why or why not?

b. Is Party A a tied mover, a tied stayer, or neither? Why?

c. Is Party B a tied mover, a tied stayer, or neither? Why?

STATE OF IOWA
IOWA DEPARTMENT OF PUBLIC HEALTH
Bureau of Health Statistics and Vital Records

County _____
License No. _____
Date of Application _____
Valid Date of License _____

APPLICATION FOR LICENSE TO MARRY IN IOWA
Type or print legibly in black or dark blue ink. Do not use all capital letters.

PARTY A *(Information to be completed by the first applicant)*   Check One *(Optional)* ☐ Bride   ☐ Groom   ☐ Spouse
FULL LEGAL NAME BEFORE MARRIAGE *(Include any generational suffix after last name)*
First   Middle *(If any)*   Current Last *(Surname)*   Last Name Prior to ANY Marriage

FULL LEGAL NAME CHANGE ADOPTED THROUGH MARRIAGE *(Include any generational suffix after last name)*
First Name After Marriage   Middle Name *(If any)* After Marriage   Last Name *(Surname)* After Marriage

CURRENT PLACE OF RESIDENCE   State   City   County

STATE OF BIRTH *(If not United States, name of foreign country)*   DATE OF BIRTH *(Month, Day, Year)*   GENDER *(Optional)*

PARTY A'S PARENT *Optional* Check One ☐ Mother ☐ Father ☐ Parent   PARTY A'S PARENT *Optional* Check One ☐ Mother ☐ Father ☐ Parent
Parent's Name Prior to any Marriage   Parent's Name Prior to any Marriage

PARTY B *(Information to be completed by the second applicant)*   Check One *(Optional)* ☐ Bride   ☐ Groom   ☐ Spouse
FULL LEGAL NAME BEFORE MARRIAGE *(Include any generational suffix after last name)*
First   Middle *(If any)*   Current Last *(Surname)*   Last Name Prior to ANY Marriage

FULL LEGAL NAME CHANGE ADOPTED THROUGH MARRIAGE *(Include any generational suffix after last name)*
First Name After Marriage   Middle Name *(If any)* After Marriage   Last Name *(Surname)* After Marriage

CURRENT PLACE OF RESIDENCE   State   City   County

STATE OF BIRTH *(If not United States, name of foreign country)*   DATE OF BIRTH *(Month, Day, Year)*   GENDER *(Optional)*

PARTY B'S PARENT *Optional* Check One ☐ Mother ☐ Father ☐ Parent   PARTY B'S PARENT *Optional* Check One ☐ Mother ☐ Father ☐ Parent
Parent's Name Prior to any Marriage   Parent's Name Prior to any Marriage

(4) [Roy model: 6 pts] Suppose Country X and Country Y each have workers whose skill (S) ranges from 0 to 100. The relationship between wages and skill in Country X is given by $W_X = 60 + 2S$. The relationship in Country Y is given by $W_Y = 10 + 3S$. Assume that moving costs are **$20**.

   a. [4 pts] For what range of values of S will workers in Country X want to migrate to Country Y? Show your work and circle your final answer.

   b. [2 pts] Is this immigrant flow positively or negatively selected? Justify your answer.

(5) [Immigration surplus: 8 pts] The graph below depicts the demand for low-skilled workers in the U.S.
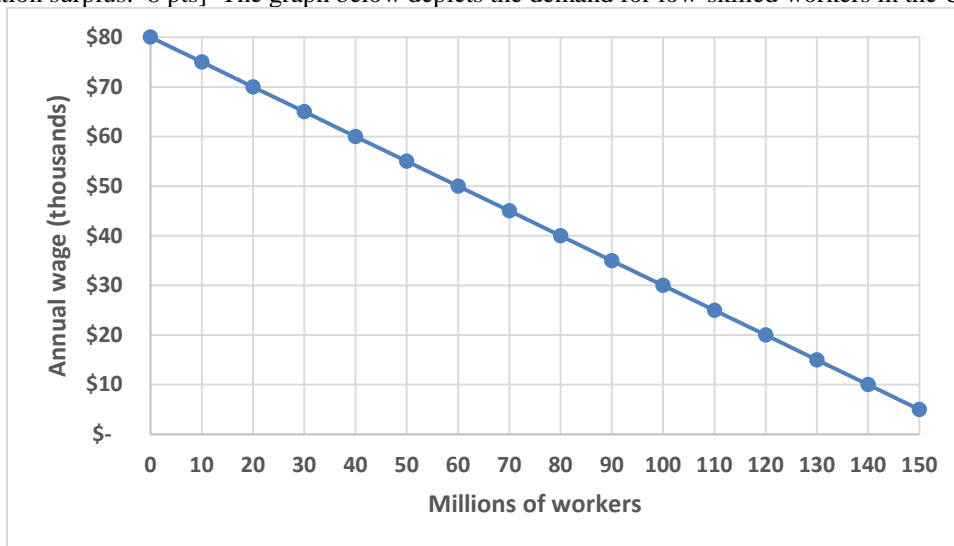
Suppose there are 80 million low-skilled native workers who supply labor inelastically. Suppose that 20 million low-skilled workers would enter the U.S. and supply labor inelastically if the U.S. allowed free immigration. Compute the following.

   a. Compute the equilibrium wage without immigration.

   b. Compute the equilibrium wage with free immigration.

   c. Compute the amount of surplus that would be transferred from native U.S. workers to U.S. employers under free immigration.

   d. Compute the immigration surplus—the net benefit to native U.S. workers and employers from free immigration.

$	thousand
$	thousand
$	billion
$	billion

(6) [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	$\ln(W_G) = 1.1 + 0.12\, S_G$	15
Blue workers	$\ln(W_B) = 0.9 + 0.10\, S_B$	14

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.

(7) [Employer preference discrimination: 18 pts] Suppose a firm's production function is given by
$q = 30\sqrt{E_G + E_B}$, where E_G is the number of green workers employed by the firm and E_B is the number of blue
workers employed by the firm. There are no other inputs besides labor. Clearly, green and blue workers are perfect
substitutes in production. A little calculus shows that the marginal product of labor (either type) is given by
$MP_E = 15/\sqrt{E_G + E_B}$. Suppose the market wage of green workers is **$15** and the market wage of blue workers is
$10. Also assume the price of the firm's output is **$4**.

   a. First, suppose the firm does not discriminate. How many workers will it hire of each type? How much output
      does it produce? How much profit does it enjoy?

Now suppose the firm discriminates against blue workers, with discrimination coefficient d. That is, the firm
perceives the cost of blue workers as being (1+d) times their actual wage.

   b. If d = 0.2, how many workers will it hire of each type? How much output does it produce? How much profit
      does it enjoy?

   c. If d = 0.6, how many workers will it hire of each type? How much output does it produce? How much profit
      does it enjoy?

(8) [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 $w_G = 3 + (E_G/100)$. Supply of blue workers to the same employer is given by $w_B = 1 + (E_B/50)$. The value of marginal product of all workers is constant and equal to **$25**.

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.

$MLC_G =$ $\qquad\qquad\qquad\qquad$ $MLC_B =$

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?

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

(1) Could the following occupations be characterized by Sherwin Rosen's "superstar" phenomenon? Why or why not?
  a. Heart surgeon.
  b. Violinist.

(2) Suppose data from the latest census shows that immigrants who have been in the U.S. for 10 years earn an average of $30,000 per year, and immigrants who have been in the U.S. for 30 years earn an average of $60,000. Can we conclude that immigrants typically double their earnings with 20 years' work experience? Why or why not? (Assume all immigrants work continuously.)

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]