# FINAL EXAMINATION VERSION B
May 8, 2012

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

I. Multiple choice: Circle the one best answer to each question. [3 pts each, 60 pts total]

(1) A person who is not currently working, and last looked for a job six weeks ago, would be classified in the U.S. as
a. employed.
b. unemployed.
c. out of the labor force.

(2) In the graph below, the budget constraint is changing because of
a. an increase in the wage.
b. a decrease in the wage.
c. an increase in nonlabor income.
d. a decrease in nonlabor income.
e. a change in preferences.

Consumption

Leisure
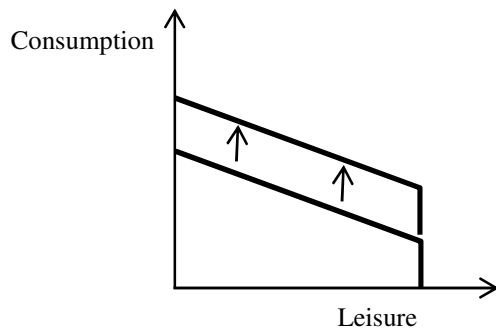
(3) If for a particular worker, the substitution effect is stronger tha the income effect, then the worker's labor supply curve
a. slopes up.
b. bends backward.
c. is vertical.
d. is horizontal.

(4) Which isoquant below exhibits greater elasticity of substitution?
a. Isoquant A.
b. Isoquant B.
c. Their elasticities of substitution are equal.
d. Cannot be determined from information given.
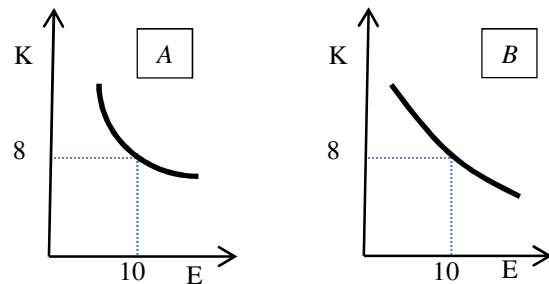
(5) Migration is efficient because
a. the population in the receiving region becomes equal to the population in the sending region.
b. the output level in the receiving region becomes equal to the output level in the sending region.
c. the rise in output in the receiving region exceeds the fall in output in the sending region.
d. the income level in the receiving region becomes equal to the income level in the sending region.

(6) Consider a diagram of hedonic equilibrium with wages on the vertical axis and risk of injury on the horizontal axis. If 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.

The next two questions refer to the following information.

Economists often estimate the relationship between earnings, schooling, and age with data on individual workers, using an equation such as the following:

$$\log(W) = \beta_1 + \beta_2 \text{ Schooling} + \beta_3 \text{ Age} + \beta_4 \text{ Age}^2 .$$

(7) In the equation above, the estimated value of β_4 is typically
a.   negative.
b.   zero.
c.   between zero and 0.5.
d.   between 0.5 and 1.0.
e.   greater than 1.0.

(8) In the equation above, the estimated value of β_2 is typically
a.   negative.
b.   zero.
c.   between zero and 0.5.
d.   between 0.5 and 1.0.
e.   greater than 1.0.

(9) Since about 1980,
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.

(10) Wages are correlated with job seniority because the typical worker
a.   enjoys returns to specific human capital.
b.   stays with a job that is a good match for the worker's skills.
c.   both (a) and (b).
d.   neither (a) nor (b).

(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.

(12) According to estimates of the Oaxaca decomposition, differences in schooling and region of residence account for
a.   almost none of the female-male wage differential.
b.   roughly half of the female-male wage differential.
c.   most of the female-male wage differential.

(13) Unions were required to disclose their finances and hold regular elections for their leaders by the
a.   Norris-LaGuardia Act of 1932.
b.   Wagner Act of 1935.
c.   Taft-Hartley Act of 1947.
d.   Landrum-Griffin Act of 1959.

(14) According to the efficient bargaining model, the unionized wage and employment level are
a.   on the labor-demand curve.
b.   to the right of the labor-demand curve.
c.   to the left of the labor-demand curve.
d.   Any of the above outcomes are possible.

(15) Unions tend to decrease
a.   the firm's profit.
b.   the return to schooling.
c.   the quit rate.
d.   all of the above.

(16) According to the efficiency-wage explanation for dual labor markets, wages are higher in the primary sector because, in that sector,
a.   workers are more able.
b.   jobs are more difficult to supervise.
c.   workers are protected by unions.
d.   jobs require more human capital.

(17) Which pay scheme pays workers *less* than their value of marginal product, initially?
a.   piece rates.
b.   time rates.
c.   tournaments.
d.   delayed compensation.
e.   efficiency wages.

(18) Which education group usually has the highest unemployment rate?
a.   no high school diploma.
b.   only high school diploma.
c.   high school diploma and some college.
d.   bachelor's degree.
e.   advanced degree.

(19) The diagram below shows the unemployment-vacancies curve (sometimes called the Beveridge curve). If there is an increase in structural unemployment,
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.
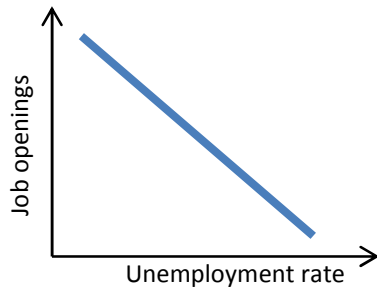
(20) Recessions are caused partly by shocks to the economy which cause some industries to grow and others to shrink. Workers in the shrinking industries often do not have the skills to take jobs in the growing industries, according to the
a. intertemporal substitution hypothesis.
b. sectoral shifts hypothesis.
c. efficiency wages hypothesis.
d. implicit contracts hypothesis.

II. Problems: Insert your answer to each question in the box provided. Show your work and circle your final answers.

(1) [Measuring the labor force: 8 pts] The U.S. Bureau of Labor Statistics reported that in July 2010, 14.6 million people were unemployed, 138.9 million people were employed, and 84.3 million working-age people were not in the labor force.
   a. Compute the working-age population to the nearest tenth of a million.

   b. Compute the unemployment rate to the nearest tenth of a percentage point.

   c. Compute the employment rate (or employment-to-population ratio) to the nearest tenth of a percentage point.

   d. Compute the labor force participation rate to the nearest tenth of a percentage point.

(2) [Labor supply: 12 pts] Let L denote the weekly hours of leisure Brian enjoys and let C denote the dollars of consumption. Suppose Brian's utility function is $U = (C-30)(L-15)$, so that his marginal utility of consumption is $MU_C = L-15$ and his marginal utility of leisure is $MU_L = (C-30)$. He has \$150 in weekly nonlabor income. He has 75 hours per week available for work or leisure.

    a. Compute Brian's reservation wage.

Suppose Brian can work as many hours as he likes at an hourly wage of \$15 per hour.

    b. Give an equation for his budget constraint in terms of L and C.

    c. How much leisure L and consumption C will he choose to enjoy?

    d. How many hours will he choose to work?

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

$$q = 5 \ K^{1/2} \ E^{1/2}$$

so that the marginal product of labor is

$$MP_E = (5/2) \ (K/E)^{1/2} \ .$$

The price of output is $30, the wage is $10 per hour, and the price of capital is $500. The current capital stock is fixed at K=16 units.

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

b. How much output q will Acme produce?

c. How much profit will Acme earn?

(4) [LR labor demand: 4 pts] Two industries have the following characteristics. Note that some of the data are extraneous and not necessary to solve this problem.

	Industry A	Industry B
Hourly wage	$15	$10
Price of output	$50	$20
Elasticity of demand for output	-0.8	-0.8
Elasticity of substitution in production	1.0	1.5
Share of labor in total cost	0.7	0.7
Employment	1000	3000

Which industry has more elastic demand for labor? Why?

(5) [Payroll tax: 14 pts] The graph below shows demand and supply for workers in a particular labor market.
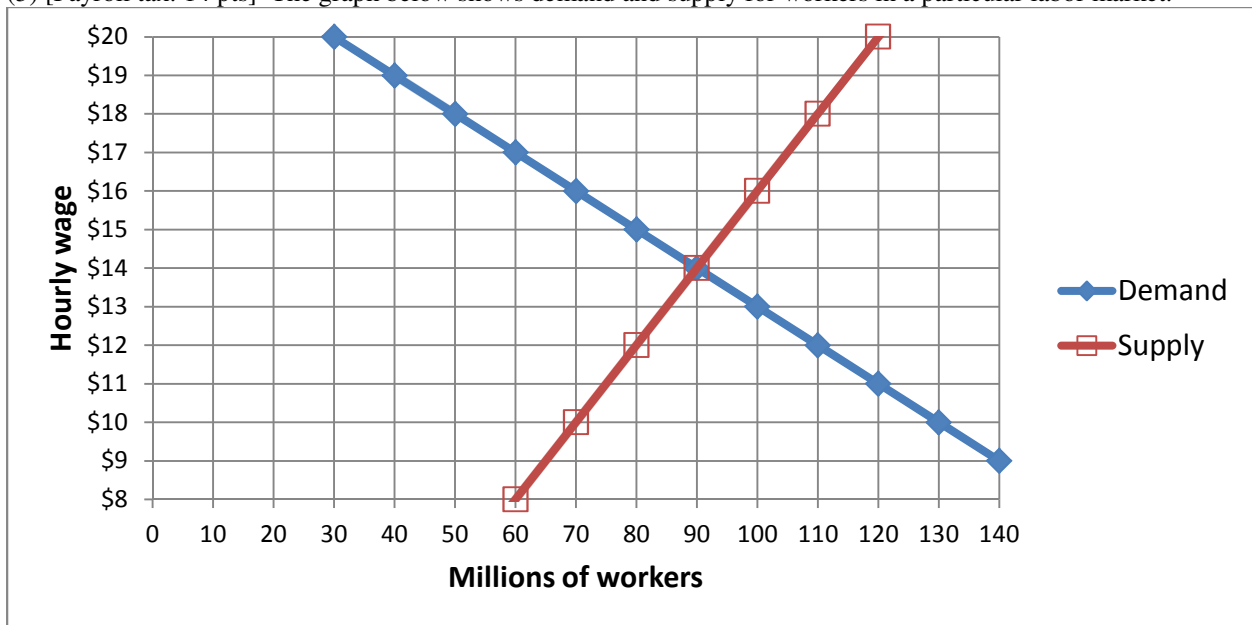
Suppose the government imposes a payroll tax of **$ 6** per hour.

a. Find the new level of employment.

	million

b. Find the new total labor cost per hour for employers (including the tax).

$	

c. Find the new net wage per hour for workers (excluding the tax).

$	

d. Compute the loss of employer surplus as a result of the tax (per hour).

$	million

e. Compute the loss of worker surplus as a result of the tax (per hour).

$	million

f. Compute the total tax revenue collected by the government (per hour).

$	million

g. Compute the deadweight loss caused by the tax (per hour).

$	million

(6) [Cobweb model: 12 pts] Suppose the demand for rocket scientists depends on the current level of wages:
$$w_t = 60 - 0.005\, E_t .$$
However, it takes time for new rocket scientists to enter the market because extensive education is required.
Assume the supply of rocket scientists depends on the previous period's wages:
$$E_t = 100\, w_{t-1} .$$

　　a. Compute the initial equilibrium levels of employment (E) and the wage (w).

Now suppose a new government program shifts the demand up to $w_t = 120 - 0.005\, E_t$, creating a boom.
　　b. Compute the new wage for this boom period.

　　c. Compute the next "bust" period employment (E) and wage (w).

　　d. Compute the next "boom" period employment (E) and wage (w).

　　e. Compute the next "bust" period employment (E) and wage (w).

　　f. Compute the long-run employment (E) and wage (w) to which the market is gradually converging.

(7) [Monopsony: 6 pts] Suppose a monopsony employer's demand for workers is given by

$$VMP = 37 - (E/100).$$

The employer's supply is given by

$$w = 1 + (E/200),$$

so its marginal labor cost is given by

$$MLC = 1 + (E/100).$$

  a. What level of employment (E) will the employer choose?

  b. What wage (w) will it pay?

  c. Suppose the government imposes a minimum wage of $12 per hour. What level of employment (E) will the employer now choose?

(8) [Immigration surplus: 8 pts] Suppose demand for low-skilled workers in the U.S. is given by

$$w = 28 - 0.1\ E$$

where w denotes the hourly wage and E denotes employment (in millions). Suppose there are 150 million domestic U.S. low-skilled workers who supply labor inelastically. Suppose also that 30 million workers would enter the U.S. and supply labor inelastically if the U.S. allowed free immigration.

  a. Compute the equilibrium wage without immigration.

  b. Compute the equilibrium wage with free immigration.

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

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

(9) [Value of a statistical life: 5 pts] Job A pays $22 per hour and Job B pays $19 per hour. However Job A carries an annual risk of death of 9/10,000 (0.0009) while Job B carries an annual risk of 1/10,000 (0.0001). Assume a typical worker works 2000 hours per year. Compute the value of a statistical life from these data.

(10) [Simple model of schooling decision: 10 pts] Suppose a person lives for two periods and must choose between two careers. If the person chooses "no college," the person earns $110,000 in the first period, and then $500,000 in the second period. If the person chooses "college," the person earns nothing in the first period and pays college costs of $40,000, and then earns $680,000 in the second period.

First, suppose the discount rate between the two periods is $r = 15\%$.
    a. Compute the net present value of "no college."

    b. Compute the net present value of "college."

    c. Which career will the person choose: "no college" or "college"?

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

    e. If a person's discount rate were *greater* than r^* (found in part d) would that person choose "no college" or "college"?

(11) [Measuring inequality: 14 pts] Suppose 70% of workers earn $20,000 per year and 30% of workers earn $120,000 per year.
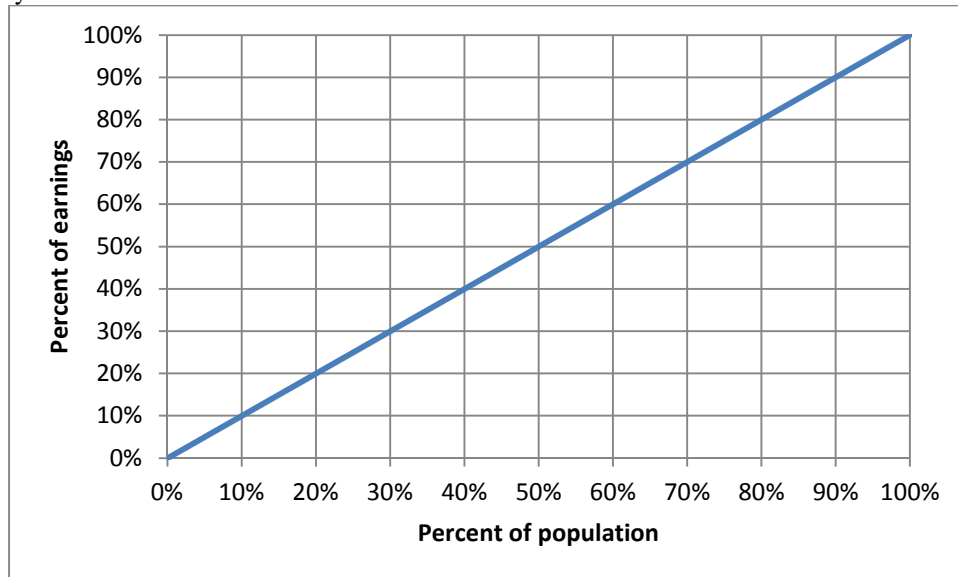
a. [6 pts] Draw the Lorenz curve for earnings in the graph above. Circle any kink points.

b. [2 pts] Compute the Gini coefficient.

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

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

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

(12) [Oaxaca decomposition: 6 pts] Suppose that for green workers, the relationship between schooling and the hourly wage is given by $\ln(\text{wage}_G) = 1.3 + 0.1\ S_G$, while for blue workers, the relationship is $\ln(\text{wage}_B) = 1.2 + 0.08\ S_B$. On average, green workers have 12 years of schooling, while blue workers have 10 years.

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

b. Compute the log wage differential due to schooling.

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

(13) [Household production-possibility curve: 10 pts] Party A can earn $20 per hour in the labor market and can produce 20 units of household services per hour. Party B can earn $15 per hour and can produce 5 units of household services per hour. Each party has 10 hours per day available for paid work or household production.
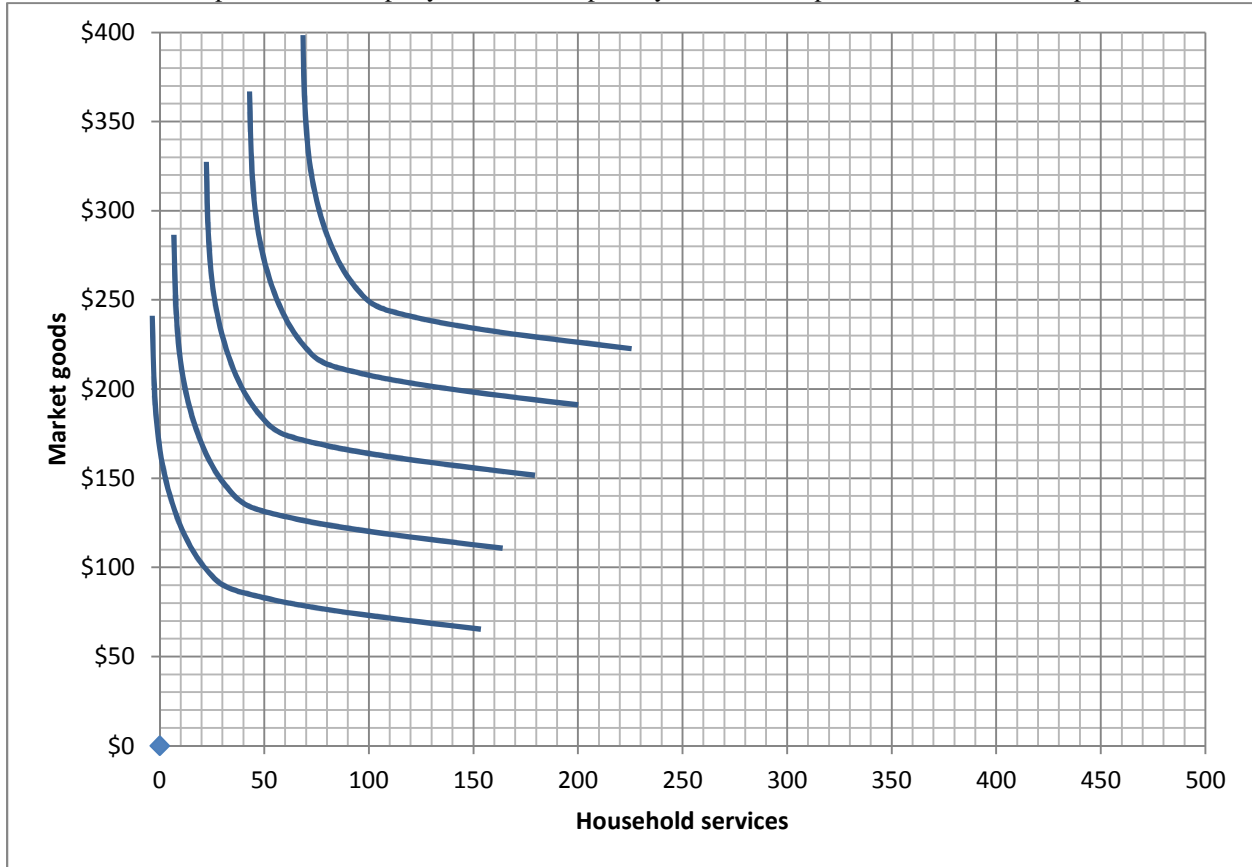
Suppose Party A and Party B form a household. The graph above shows the household's indifference curves.

  a. [6 pts] Draw the household's joint production-possibility curve in the graph
    above. Circle any kink points.

  b. [2 pts] How many hours per day will Party A work in the labor market?   hours

  c. [2 pts] How many hours per day will Party B work in the labor market?   hours

(14) [Monopoly union model: 4 pts] Suppose a union's utility function is U=(w-5)E. This implies that the union's marginal utility of the wage is E, and marginal utility of employment is (w-5). Suppose the union faces an employer whose labor demand curve is VMP = 25 – 0.02 E . [See Excel spreadsheet for variations.]

  a. Compute the wage demanded by the union.

  b. Compute the employment level.

(15) [Mandatory retirement: 6 pts] Suppose a firm uses delayed compensation to discourage shirking. The workers' VMP is constant at $35,000 per year, but the firm instead pays a wage of ($20,000 + 1000t) where t denotes years of service with the firm. For simplicity, assume that workers' discount rate is 0%, and that wages are adjusted continuously rather than once a year.

  a. After how many years of service does the wage equal VMP?

  b. After how many years of service will the firm want to impose mandatory retirement?

  c. Assume that the firm is able to impose mandatory retirement somehow, as computed in part (b). Suppose a worker were fired after 20 years of service and forced to take another job at $35,000 for the rest of her career. How much would the worker lose in total?

(16) [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	(a)	0.03
	Unemployment	0.47	(b)

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.

[end of exam]