ECON 115 - Labor Economics
Drake University, Spring 2020
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EXAMINATION 1 VERSION A
"Labor Supply and Demand"
February 27, 2020

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, 20 pts total]

(1) Equilibrium in a labor market describes a situation where
a. the number of workers equals the number of consumers.
b. the wage is reasonable.
c. the quantity of labor demanded equals the quantity supplied.
d. workers have no motivation to strike.

(2) Suppose the wages of IT professionals rise and the number of people working in IT increases. This could be caused by
a. a rightward shift in the supply of IT professionals.
b. a leftward shift in the supply of IT professionals.
c. a rightward shift in the demand for IT professionals.
d. a leftward shift in the demand for IT professionals.

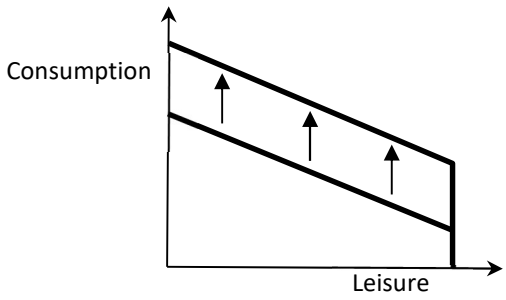
(3) The steeper the labor demand curve,
a. the more elastic labor demand.
b. the less elastic labor demand.
c. the more elastic labor supply.
d. the less elastic labor supply.
e. Steepness of labor demand is unrelated to the elasticities of labor demand or supply.

(4) A coefficient estimate in a regression equation is conventionally considered statistically significant if its
a. standard error is less than 0.05.
b. R^2 value is greater than 0.9.
c. t-statistic is greater than 2.
d. p-value is greater than 2.

(5) The *unemployment rate* is defined as the number of people who are unemployed, divided by
a. the number of people who are employed.
b. the number of people who are in the labor force.
c. the number of people who are not in the labor force.
d. the working-age population.

(6) A utility function shows
a. the prices of electricity, gas, and water.
b. how a person ranks different bundles.
c. how many hours a person would work at any given wage.
d. the usefulness of a worker to her or his employer.

(7) 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.



(8) If leisure and consumption are normal goods according to a person's preferences, then an increase in nonlabor income would cause the person to choose to work
a. more hours.
b. fewer hours.
c. exactly the same number of hours.
d. either more or fewer hours—answer cannot be determined from information given.

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

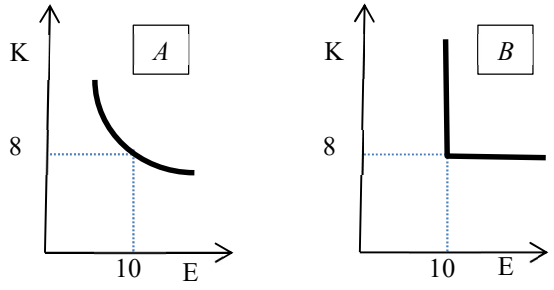
(10) Consider a cash grant welfare program, where a person is given $3000 that is reduced by $0.50 for every $1.00 of labor earnings. According to economic theory, this program would cause
a. an increase in work hours by those already working.
b. a decrease in work hours by those already working.
c. an increase in labor force participation.
d. a decrease in consumption.

(11) A dynamic model of labor supply predicts that, in periods where the wage is higher, labor force participation and hours of work will be higher because a temporary change in the wage
a. creates only a substitution effect.
b. creates only an income effect.
c. creates both an income effect and a substitution effect.
d. creates neither an income effect nor a substitution effect.

(12) If the wage is greater than the value of marginal product of labor, the firm can increase profit by
a. hiring more labor.
b. hiring less labor.
c. it cannot increase its profit by changing its labor input by small amounts.
d. any of the above.

(13) At the firm's cost-minimizing combination of labor and capital,
a. the elasticity of substitution equals one.
b. the marginal rate of technical substitution equals the ratio of input prices.
c. the price of capital equals the price of labor.
d. the marginal product of capital equals the marginal product of labor.

(14) 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.



(15) When all firms in an industry enjoy a wage decrease, they each increase their labor input less than they would if only one firm enjoyed the same wage decrease because
a. it is harder to find workers.
b. the output price falls.
c. the capital stock is reduced.
d. the production function shifts down.

(16) 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.

(17) According to the Hicks-Marshall rules, labor demand by an industry is *less* elastic in the long run,
a. the smaller the level of total output.
b. the smaller the elasticity of labor supply.
c. the smaller the capital/labor ratio.
d. the smaller the share of labor in total cost.
e. all of the above.

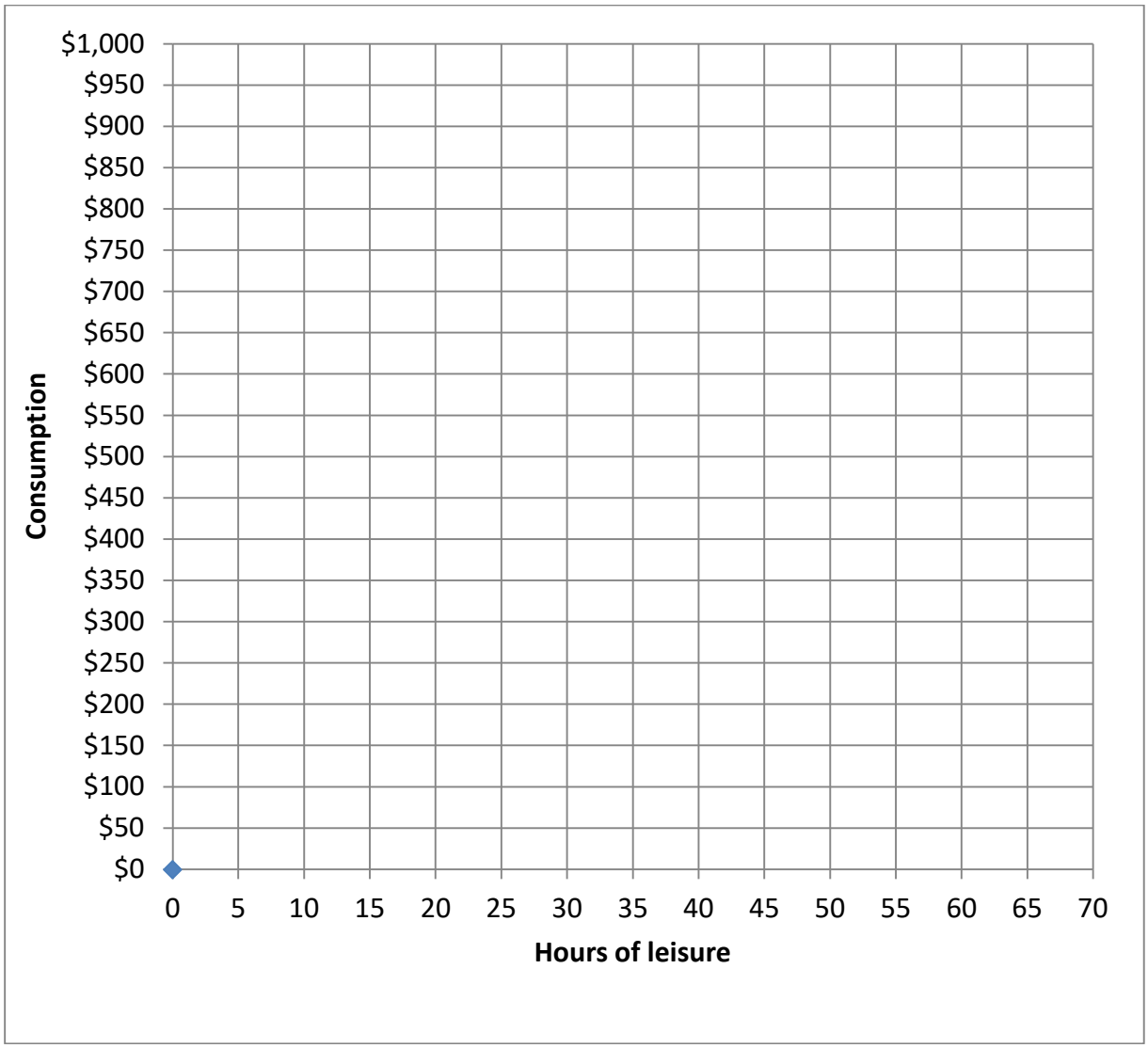
(18) Available evidence seems to indicate that capital and unskilled workers are
a. complements in production.
b. substitutes in production.
c. unrelated in production.
d. outputs in production.

(19) The U.S. federal minimum wage has risen over time because
a. it is indexed to inflation.
b. it is indexed to GDP.
c. Congress has periodically raised it.
d. the Fair Labor Standards Act mandates that it be raised 2 percent per year.

(20) An increase in the firm's fixed costs of employing each worker will likely
a. increase the number of part-time workers and decrease the number of full-time workers.
b. decrease the number of part-time workers and increase the number of full-time workers.
c. increase both the number of part-time workers and the number of full-time workers.

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. Work carefully—partial credit is not normally given in this section.

(1) [Budget constraint: 6 pts] Suppose Anna has 60 hours of time available each week for work or leisure, enjoys weekly nonlabor income of $100, and can earn a wage of $10 per hour. A government program supplements her earnings with a 50% wage subsidy, raising her effective wage to $15 per hour. However, once her total weekly income (including the subsidy) reaches $400, additional labor earnings are not eligible for the subsidy. Thus once her weekly income reaches $400, her effective wage on any further work is again $10 per hour. *Using a straightedge,* draw a graph of Anna's weekly budget constraint. Label the endowment point and any other kink points.



(2) [Individual labor supply—optimal choice: 12 pts] Let L denote the weekly hours of leisure Amy enjoys and let C denote the dollars of consumption. Suppose Amy's utility function is U = (C-200)(L-10). A little calculus shows that her marginal utility of consumption is MU_C = L-10 and her marginal utility of leisure is MU_L = C-200. She has $400 in weekly nonlabor income and 60 hours per week available for work or leisure.

a. [2 pts] Give a formula in terms of C and L for Amy's marginal rate of substitution of leisure for consumption (MRS).

b. Compute Amy's reservation wage per hour.

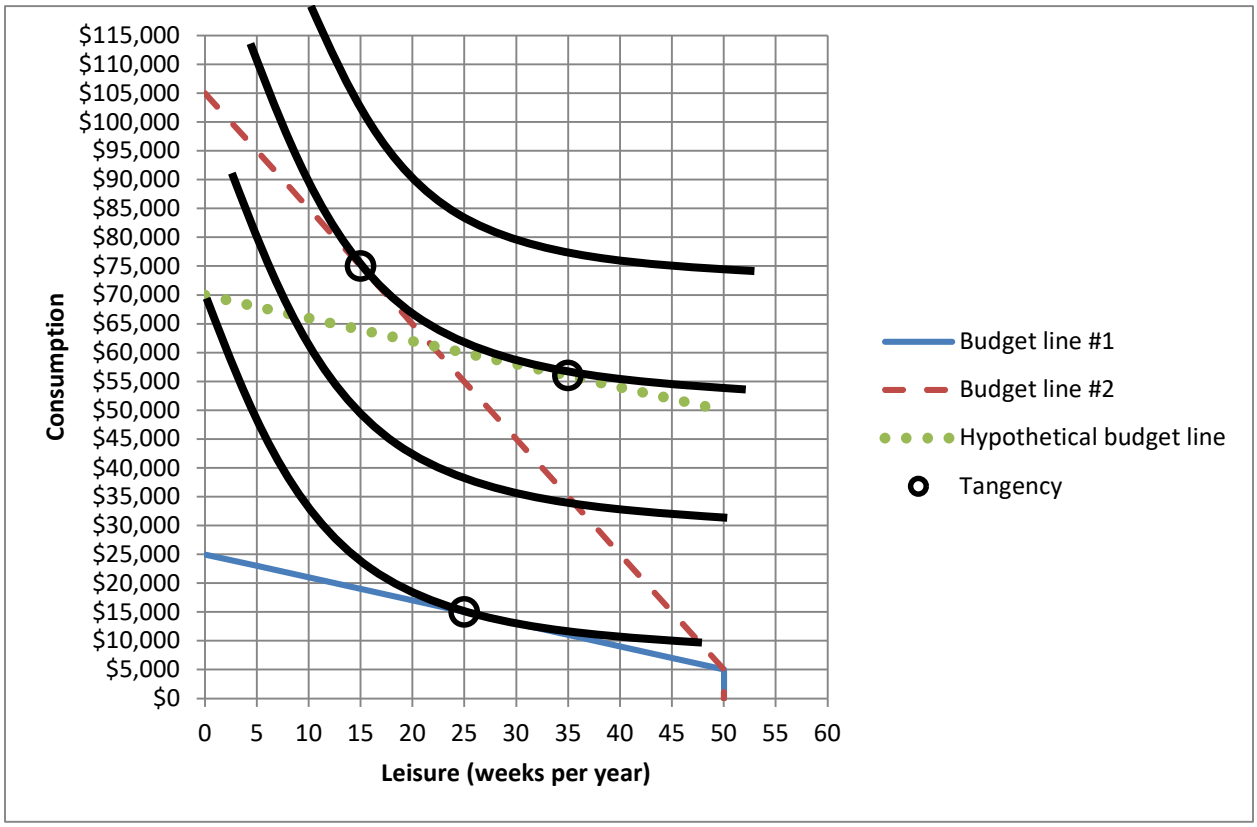
Suppose Amy can work as many hours as she likes at a wage of $10 per hour.

c. Give an equation for her weekly budget constraint in terms of L and C.

d. How much leisure L and consumption C will she choose to enjoy per week?

e. [1 pt] How many hours will she choose to work per week?

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

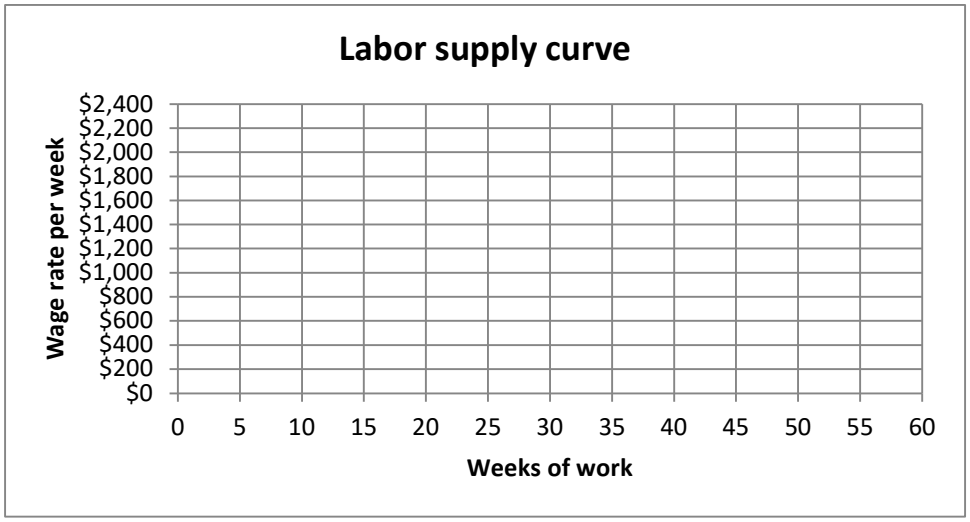


a. According to this graph, what is Aaron's total available time for work or leisure?	weeks
b. How much nonlabor income does Aaron enjoy?	$
c. What is Aaron's wage rate on budget line #1?	$ per week
d. What is Aaron's wage rate on budget line #2?	$ per week

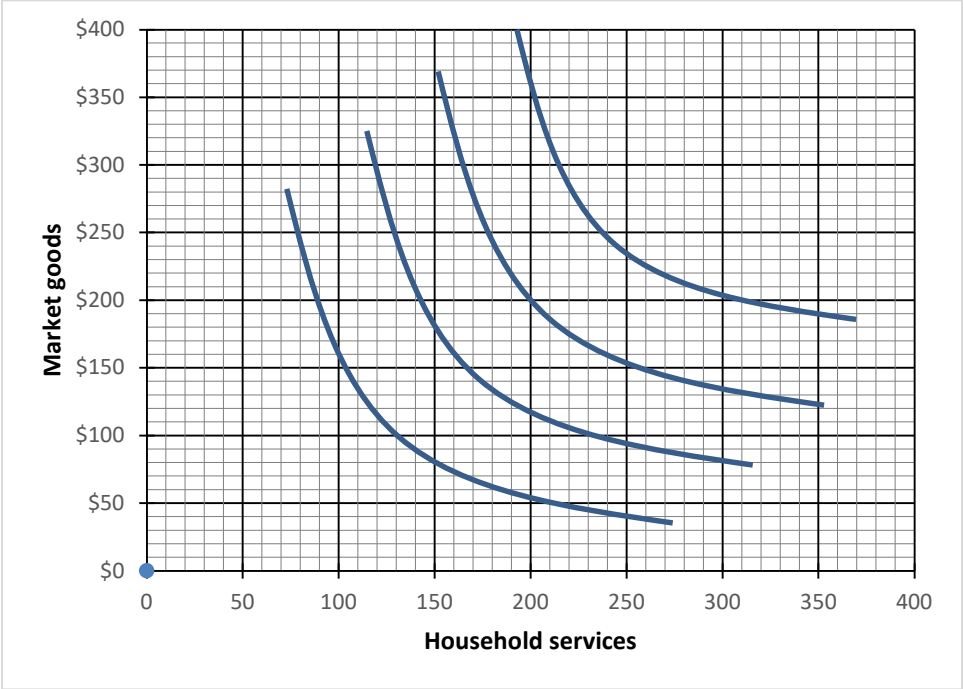
Consider Aaron's response to the change in the wage rate from budget line #1 to budget line #2.

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

k. Using the information in this indifference-curve graph, plot two points on Aaron's *labor supply curve* in the graph on the **next page**.



(4) [Household specialization: 10 pts] Party A can earn $10 per hour in the labor market and can produce 20 units of household services per hour. Party B can earn $20 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?

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

	hours
	hours

(5) [SR labor demand: 9 pts] Suppose Bulldog Manufacturing Company has the following production function.

$$q = 10\,(K\,E)^{1/2}\,.$$

A little calculus shows that the marginal product of labor is

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

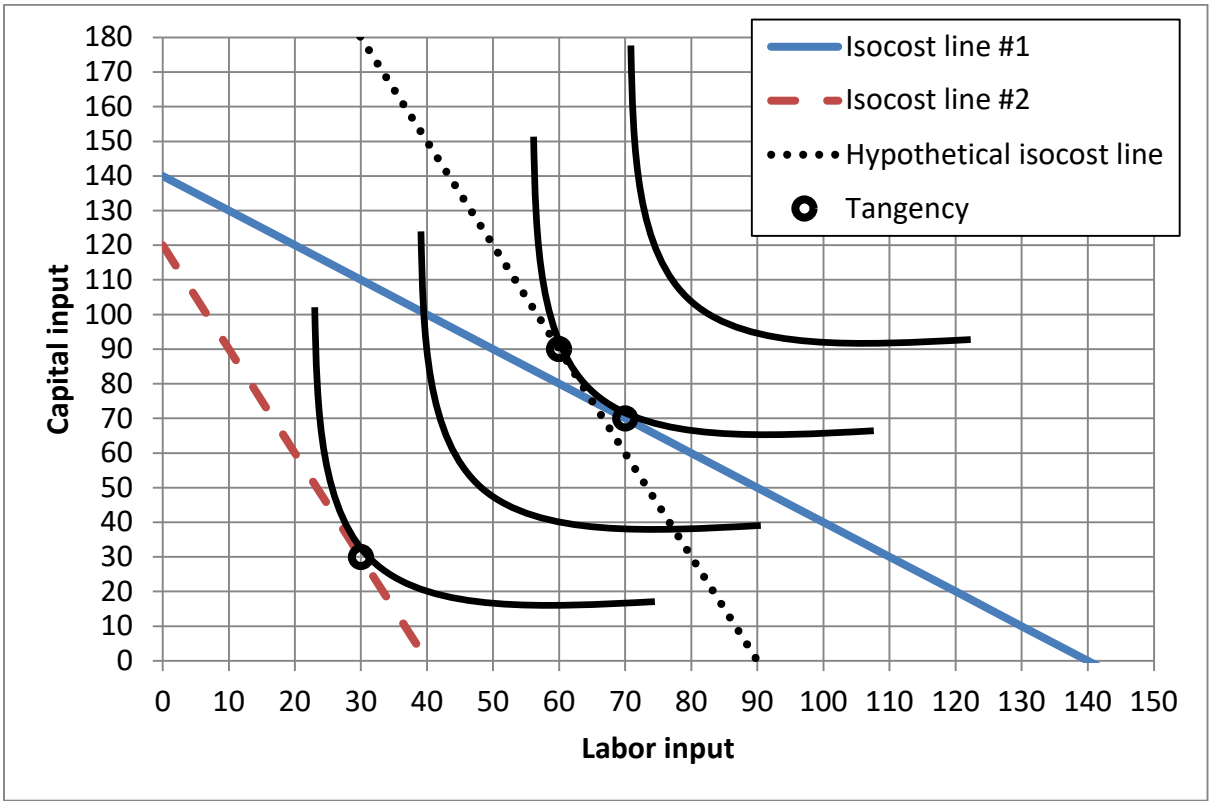
The price of output is \$10, the wage is \$25 per hour, and the price of capital is \$50 per hour. The capital stock is fixed at K=8 units.

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

b. How much output q will Bulldog produce?

c. How much profit will Bulldog enjoy?

(6) [LR labor demand—scale and substitution effects: 16 pts] Acme Manufacturing Company uses labor and capital to make snowshovels. The graph below shows Acme's isoquants, two true isocost lines, and one hypothetical isocost line parallel to isocost line #2.



The price of capital used by Acme is always \$10. However, the wage (the price of labor) changes.

a. Initially, Acme is on isocost line #1. What is the wage on isocost line #1?	\$
b. Then in response to a change in the price of labor, Acme moves to isocost line #2. What is the wage on isocost line #2?	\$

Consider the effects of this change in the wage on Acme's use of labor input.

c. Does the substitution effect cause Acme to use *more* labor or *less* labor input?	
d. How much? That is, give the change in labor input caused by the substitution effect of the wage change.	units
e. Does the scale effect cause Acme to use *more* labor or *less* labor input?	
f. How much? That is, give the change in labor input caused by the scale effect of the wage change.	units
g. Does the total effect cause Acme to use *more* labor or *less* labor input?	
h. How much? That is, give the change in labor input caused by the total effect of the wage change.	units

III. Critical thinking: Write a one-paragraph essay answering *only one* question below (your choice). [5 pts]

(1) Over the last 100 years, average household income has increased substantially in the U.S. Meanwhile, over the same period, the total fertility rate (the average number of children born to a woman during her lifetime) has fallen in the U.S. from three children per woman to two children per woman. Does this suggest that children are economically inferior goods? Why or why not? Explain your answer with an indifference-curve diagram. Label all curves and axes.

(2) To test the effectiveness of a new program to help low-income people find jobs, 4860 people receiving TANF[1] (a welfare program) were divided into two groups. The first group stayed on the TANF program from 1999 to 2000. In 1999, average hours of work for those working were 12.8, while in 2000, average hours were 13.2. The second group was shifted from TANF in 1999 to NIT[2] (the new program) in 2000. In 1999, average hours of work for those working were 12.5, while in 2000, average hours were 11.9. Use the difference-in-differences approach to compute the *change in hours of work by those people who worked* caused by switching to the new program.

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]

[1] TANF = Temporary Aid to Needy Families.
[2] NIT = Negative Income Tax.