

Your Name: \_\_\_\_\_ uniquename \_\_\_\_\_

**Ford School of Public Policy 555: Microeconomics A**

Fall 2011

Exam 1 October 4, 2011

Professor Kevin Stange

This exam has 8 questions and spans the topics we have covered so far in the course. Please explain your answers when asked and **show your work**. It is in your best interest to show each of your steps clearly in order to receive partial credit and so that you are not penalized in later parts for math mistakes in earlier ones. You have 80 minutes to complete the exam. Each question indicates the points each question is worth – you should use this as a guide to the number of minutes you can spend on each question. The points sum to 90, so 10 points are bonus. Good luck!

**Short Answer [24]**

1. [3] True or False. “If consumers are choosing between two normal goods, then if the price of both goods doubles, the substitution effect will cause consumption of the less expensive good to increase.” Briefly explain your answer.
  
2. [2] Suppose burgers and hot dogs are both normal goods. What is the effect of an increase in the price of burgers? Circle all that apply.
  - a. Consumption of burgers will definitely increase
  - b. Consumption of burgers will definitely decrease
  - c. Consumption of burgers may increase or decrease
  - d. Consumption of hot dogs will definitely increase
  - e. Consumption of hot dogs will definitely decrease
  - f. Consumption of hot dogs may increase or decrease
  
3. [4] Our dog GoGo only consumes two goods: steak and dogfood. Given her current level of consumption of these two goods, her marginal utility for steak is 20 and her marginal utility for dogfood is 5. The price of steak is \$8.00. What must the price of dogfood be for GoGo to be consuming the optimal amount of each good? Assume that GoGo has diminishing marginal utility for all goods.

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4. [5] Many states require individuals to obtain an occupational license before they can work in certain professions (e.g. nurses, doctors, manicurists, electricians, teachers). Proponents of licensing claim that it ensures quality, which increases the perceived value of the service to consumers (and their willingness-to-pay). Critics of licensing claim that it makes it more costly for people to enter these professions, restricting supply. Assuming both are correct, what will licensing do to the quantity and price of manicurist services in equilibrium compared to no licensing? Circle all that apply.
- a. Definitely increase quantity
  - b. Increase or decrease quantity
  - c. Definitely decrease quantity
  - d. Definitely increase price
  - e. Increase or decrease price
  - f. Definitely decrease price
5. [10] Suppose the market price for a top-tier legal education (such as at the University of Michigan) is \$50,000 per year. Assume this market is competitive. Could a price ceiling that prevented law schools from charging more than \$40,000 per year ever harm current and potential law school students in the aggregate? Explain.

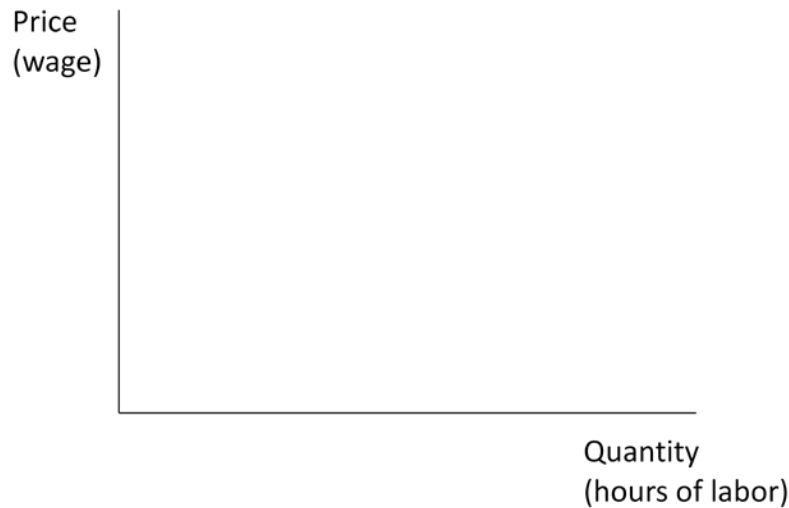
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6. [28] **Supply & Demand.** This question asks you to use supply and demand analysis to contrast the impact of immigration on the market for lower-skilled workers in two different cities.

Phoenix

Suppose that the supply of lower-skilled labor in Phoenix is given by  $Q_s = 20 + 2P$  and the demand for lower-skilled labor is given by  $Q_d = 100 - 3P$ . Quantity (Q) is measured in hours worked and the price (P) of an hour worked is given by the wage.

- a. [5] Draw supply and demand curves in the space below. Label all intercepts and slopes. Be sure to indicate which line is the supply curve and which line is the demand curve. Your graph does not need to be to scale.



- b. [5] What is the equilibrium price and quantity of lower-skilled labor in Phoenix? Label these  $P^*$  and  $Q^*$  on your graph.

- c. [3] At this equilibrium price and quantity level, calculate the price elasticity of demand in Phoenix?

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- d. [5] Suppose that the Phoenix labor market was to experience an influx of lower-skilled immigrants. Illustrate this event using shifts in supply and/or demand curves on your graph above showing the new equilibrium price and quantity. What will happen? Circle all that apply.
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  - ii. Increase or decrease quantity
  - iii. Decrease quantity definitely
  - iv. Increase price definitely
  - v. Increase or decrease price
  - vi. Decrease price definitely

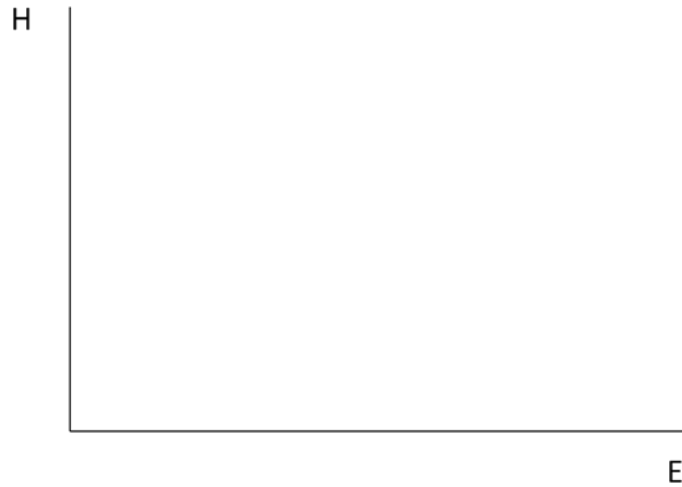
Miami

In 1980 there was a mass exodus of Cubans from Cuba's Mariel harbor to the United States (known as the "Mariel Boatlift"). Most of these new immigrants were lower-skilled and settled in Miami. Empirical analysis of this event has shown that there was almost no change in the wage of low-skilled native workers in Miami following the Boatlift.

- e. [10] What does the event imply about the elasticity of demand for low-skilled labor in Miami at the time? Was demand for lower-skilled labor more or less price elastic in Miami in 1980 than it is in Phoenix today?

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7. [28] **Consumer Choice.** Suppose that the State of Michigan is deciding how to allocate its spending between two “goods”: health care (H) and education (E). Both are normal goods. Initially the price of health care is  $P_H = \$3$  and the price of education is  $P_E = \$2$ . Michigan has a total income of \$1600 (from tax revenue).
- a. [5] On the graph below, draw the budget constraint, labeling the intercepts, any kink points (if applicable), and slopes. Put health care on the vertical axis and education on the horizontal axis. Label this  $BC_0$ .



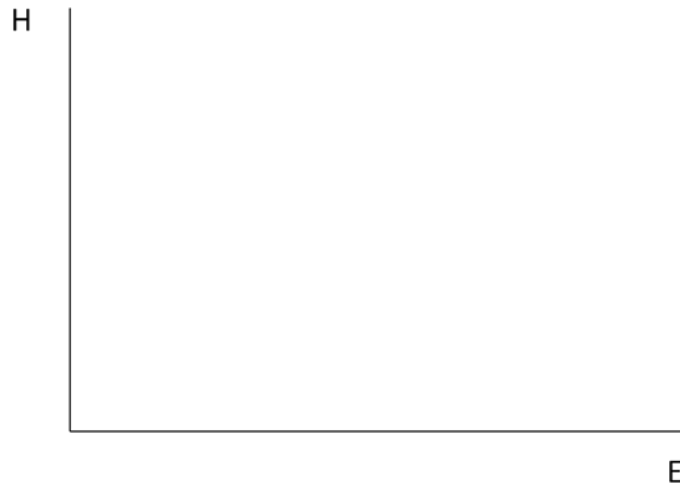
- b. [10] Suppose that Michigan has a utility function over health care (H) and education (E), described by  $U(H,E) = 10(H)^3(E)$ . How many units of H and E will Michigan purchase for its residents?

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- c. [3] Now suppose that the price of health care increases to  $P_H = \$4$ . Draw the new budget constraint on the graph below, labeling all intercepts, any kink points (if applicable), and slopes. Label this  $BC_1$ .

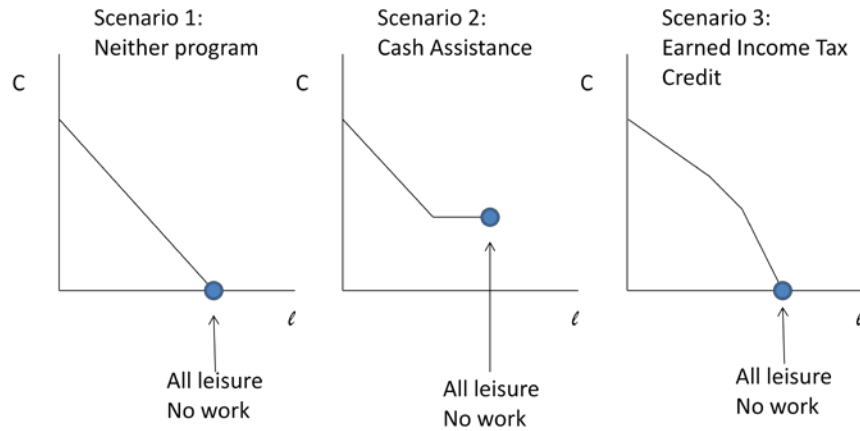
To alleviate the hardship on states of rising health care costs, suppose the Federal government introduced a program through which it provided a matching grant to states for spending on education. This program had the effect of reducing the price of first 400 units of education purchased by states from \$2 to \$1. Beyond 400 units there is no federal grant and the price remains at \$2. You should assume that all states have an income of 1600 and face this same budget constraint. Also, you can ignore the utility function from parts a and b.

- d. [5] Draw the new budget constraint on the graph below, labeling all intercepts, any kink points (if applicable), and slopes. Label this  $BC_2$ .



- e. [5] If a state was spending most of its income on education before the federal matching grant program (when facing  $BC_1$  from part c, when  $P_H = \$4$  and  $P_E = \$2$ ), is it likely to increase or decrease its spending on health when the federal grant program is introduced? Explain.

8. [10] **Challenge Question.** The three graphs below show the budget constraint for the basic labor supply model we discussed in class under three different policy scenarios: no policy, a cash assistance program (policy 2), and the EITC (policy 3). Recall that the two “goods” are total consumption (on the vertical axis) and hours of leisure (horizontal axis). Like a typical budget constraint, the slope provides the ratio between the “price” of the two goods. The point corresponding to the bundle with no work (the corner solution where all time is spent on leisure) is marked on each budget constraint. Which of the three policy scenarios is likely to generate the most people choosing this point? Which of the three scenarios is likely to generate the fewest people choosing this point? Explain your answer in terms of the “price” of leisure. NOTE: Use only the concepts discussed in this class. You do not need to know anything about these specific programs to answer this question. If it helps you to think of these simply as “Good 1” and “Good 2” that is fine.



**Useful Formulas**

The partial derivative of a function  $U(X, Y) = aX^n Y^m$  with respect to X is  $\frac{\partial U(X, Y)}{\partial X} = anX^{n-1}Y^m$  where a, n, and m are numbers.

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**Short Answer [24]**

1. [3] True or False. “If consumers are choosing between two normal goods, then if the price of both goods doubles, the substitution effect will cause consumption of the less expensive good to increase.” Briefly explain your answer.

*False. The statement is incorrect in two ways. First, if the price of both goods doubles, then the price ratio will not change. Therefore there will be no substitution effect, only an income effect. Second, this income effect will cause the consumption of both goods (including the less expensive one) to decrease (not increase) since they are both normal.*

2. [2] Suppose burgers and hot dogs are both normal goods. What is the effect of an increase in the price of burgers? Circle all that apply.
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*The price of dogfood should be \$2. If GoGo is maximizing utility, she will be consuming steak and*

*dogfood such that the MRS is equal to the price ratio:  $\frac{MU_S}{MU_D} = \frac{P_S}{P_D}$*

solving for  $P_D : P_D = P_S \frac{MU_D}{MU_S} = (8) \left( \frac{5}{20} \right) = \boxed{2}$



4. [5] Many states require individuals to obtain an occupational license before they can work in certain professions (e.g. nurses, doctors, manicurists, electricians, teachers). Proponents of licensing claim that it ensures quality, which increases the perceived value of the service to consumers (and their willingness-to-pay). Critics of licensing claim that it makes it more costly for people to enter these professions, restricting supply. Assuming both are correct, what will licensing do to the quantity and price of manicurist services in equilibrium compared to no licensing? Circle all that apply.
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*Occupational licensing will result in an inward (leftward) shift of the supply curve and an outward (rightward) shift of the demand curve. Both act to increase price, but have opposite effects on quantity.*

5. [10] Suppose the market price for a top-tier legal education (such as at the University of Michigan) is \$50,000 per year. Assume this market is competitive. Could a price ceiling that prevented law schools from charging more than \$40,000 per year ever harm current and potential law school students in the aggregate? Explain.

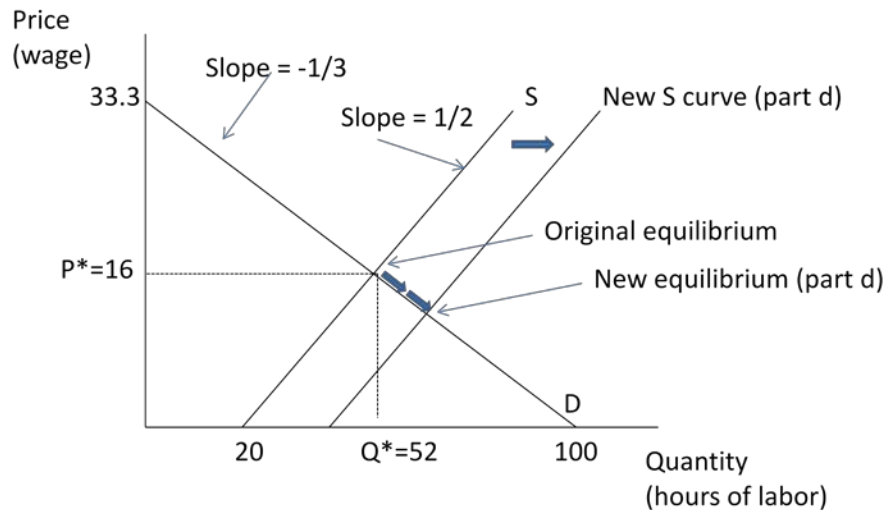
*Yes. A price ceiling below the market price will have two effects on consumers. First, those able to attend law school will now pay less, which benefits these students (i.e. increases their consumer surplus). Second, some law schools may close or reduce enrollment when the price ceiling is enacted and they are not permitted to charge higher prices. The students who are not able to get in to school (but would if there was no price ceiling) are worse off (decrease in consumer surplus). If the latter effect is larger than the former one, the aggregate effect on consumer surplus will be negative.*

6. [28] **Supply & Demand.** This question asks you to use supply and demand analysis to contrast the impact of immigration on the market for lower-skilled workers in two different cities.

Phoenix

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- b. [5] What is the equilibrium price and quantity of lower-skilled labor in Phoenix? Label these  $P^*$  and  $Q^*$  on your graph.

$$\begin{aligned}
 Q_s &= Q_d \\
 100 - 3P &= 20 + 2P \\
 80 &= 5P \\
 P &= 16 \\
 Q_s &= 100 - 3(16) \\
 Q_s &= 100 - 48 = 52 \\
 \boxed{P^* = 16, \quad Q^* = 52}
 \end{aligned}$$

- c. [3] At this equilibrium price and quantity level, calculate the price elasticity of demand in Phoenix?

$$\varepsilon_d = \frac{\Delta Q_d}{\Delta P} \frac{P}{Q} = (-3) \left( \frac{16}{52} \right) = -\frac{48}{52} = \boxed{-\frac{12}{13}} = \boxed{-0.923}$$

d. [5] Suppose that the Phoenix labor market was to experience an influx of lower-skilled immigrants. Illustrate this event using shifts in supply and/or demand curves on your graph above showing the new equilibrium price and quantity. What will happen? Circle all that apply.

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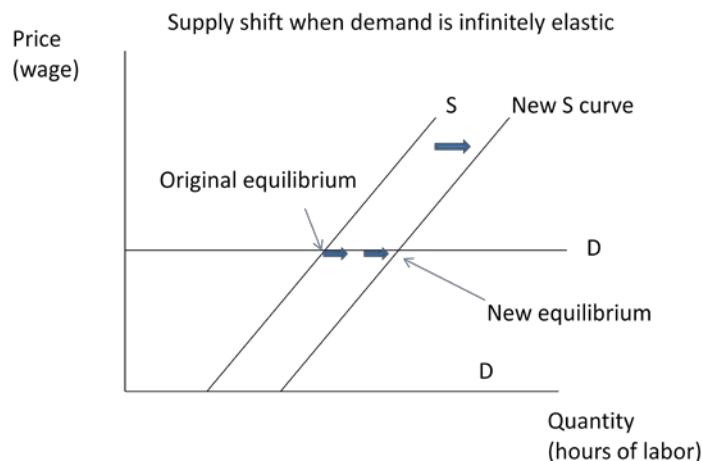
*Note: the main consequence will be a shift in the supply curve outward and this answer reflects this. However, if your graph shows both an outward shift in the supply curve and an outward shift in demand curve (because greater population will increase demand for all goods and services, increasing the demand for lower-skilled workers), then you should have selected (i) and (v).*

Miami

In 1980 there was a mass exodus of Cubans from Cuba’s Mariel harbor to the United States (known as the “Mariel Boatlift”). Most of these new immigrants were lower-skilled and settled in Miami. Empirical analysis of this event has shown that there was almost no change in the wage of low-skilled native workers in Miami following the Boatlift.

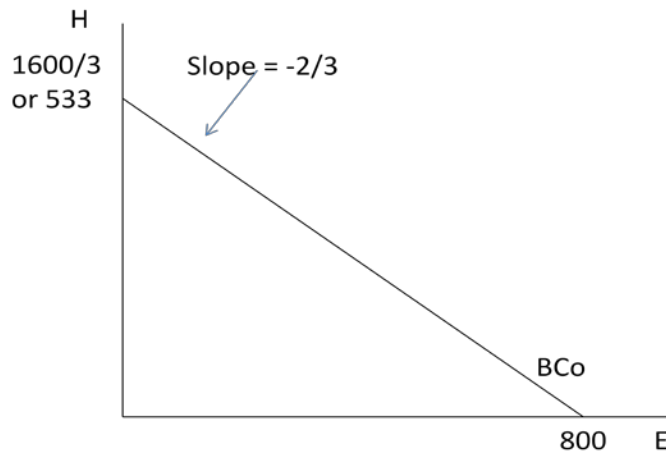
e. [10] What does the event imply about the elasticity of demand for low-skilled labor in Miami at the time? Was demand for lower-skilled labor more or less price elastic in Miami in 1980 than it is in Phoenix today?

*This implies that the demand for labor in Miami was infinitely (or perfectly) elastic at the time. The only way that an increase in the supply of low wage workers (signified by an outward shift in the supply curve) would not result in a change in the price (wage) is if the demand curve is horizontal. There will be an increase in quantity but no change in the wage. This suggests that the demand for labor was more elastic in Miami at the time than it is in Phoenix currently. [As an aside, what this means in practice is that production processes can easily absorb more workers when they become available.]*



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- b. [10] Suppose that Michigan has a utility function over health care (H) and education (E), described by  $U(H,E) = 10(H)^3(E)$ . How many units of H and E will Michigan purchase for its residents?

$$MRS = \frac{MU_H}{MU_E} = \frac{30H^2E}{10H^3} = \frac{3E}{H}$$

$$\text{set } MRS = \frac{P_H}{P_E} : \frac{3E}{H} = \frac{3}{2} \Rightarrow E = \frac{1}{2}H$$

substitute  $E = \frac{1}{2}H$  into the budget constraint:

$$1600 = P_E E + P_H H$$

$$1600 = (2)\left(\frac{1}{2}H\right) + (3)(H)$$

$$1600 = (4)(H)$$

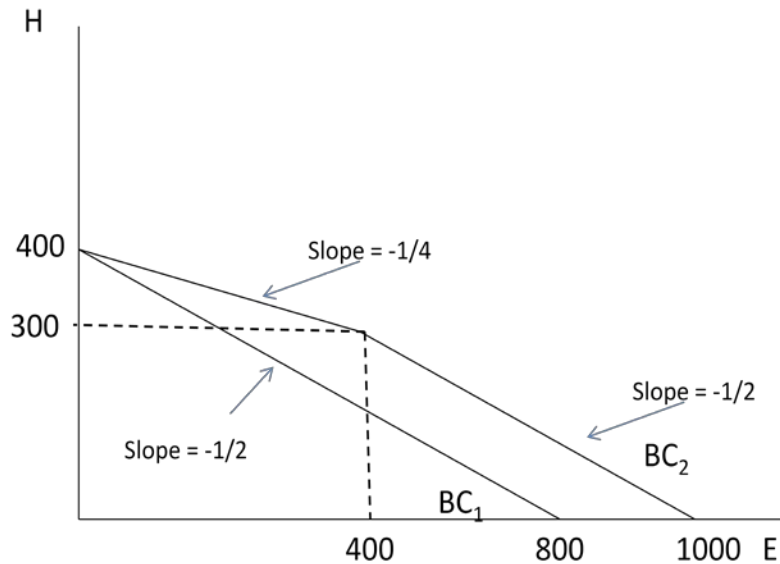
$$\boxed{H = 400}$$

$$E = \frac{1}{2}H \Rightarrow \boxed{E = 200}$$

- c. [3] Now suppose that the price of health care increases to  $P_H = \$4$ . Draw the new budget constraint on the graph below, labeling all intercepts, any kink points (if applicable), and slopes. Label this  $BC_1$ .

To alleviate the hardship on states of rising health care costs, suppose the Federal government introduced a program through which it provided a matching grant to states for spending on education. This program had the effect of reducing the price of first 400 units of education purchased by states from \$2 to \$1. Beyond 400 units there is no federal grant and the price remains at \$2. You should assume that all states have an income of 1600 and face this same budget constraint. Also, you can ignore the utility function from parts a and b.

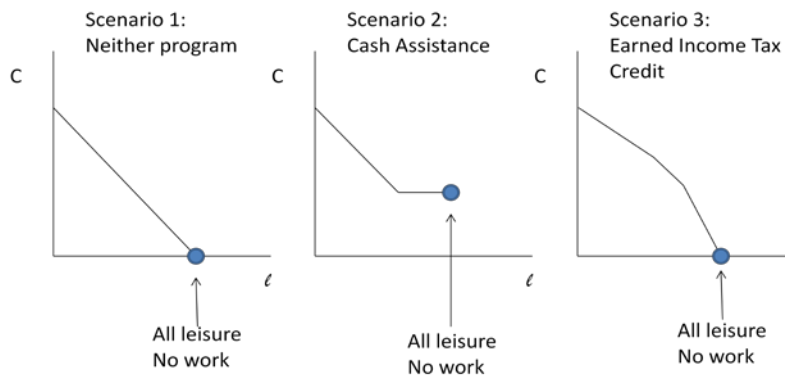
- d. [5] Draw the new budget constraint on the graph below, labeling all intercepts, any kink points (if applicable), and slopes. Label this  $BC_2$ .



- e. [5] If a state was spending most of its income on education before the federal matching grant program (when facing  $BC_1$  from part c, when  $P_H = \$4$  and  $P_E = \$2$ ), is it likely to increase or decrease its spending on health when the federal grant program is introduced? Explain.

*Likely to increase. For states that are spending most of their income on education, the policy is like a pure income increase. You can see this by looking at how the budget constraint changes at high levels of education. If a state was initially choosing a high level of education (for example,  $E = 790$ ) then the new budget constraint looks like it has just shifted out, but with no change in the relative prices (the slope of the line doesn't change). Since both  $H$  and  $E$  are normal goods, states will want to increase their consumption of both when they receive more income, thus  $H$  will increase. In contrast, states that are spending very little on education initially (for example,  $E = 10$ ) will experience both a substitution and income effect, so the net impact on their consumption of health care is ambiguous.*

8. [10] **Challenge Question.** The three graphs below show the budget constraint for the basic labor supply model we discussed in class under three different policy scenarios: no policy, a cash assistance program (policy 2), and the EITC (policy 3). Recall that the two “goods” are total consumption (on the vertical axis) and hours of leisure (horizontal axis). Like a typical budget constraint, the slope provides the ratio between the “price” of the two goods. The point corresponding to the bundle with no work (the corner solution where all time is spent on leisure) is marked on each budget constraint. Which of the three policy scenarios is likely to generate the most people choosing this point? Which of the three scenarios is likely to generate the fewest people choosing this point? Explain your answer in terms of the “price” of leisure. NOTE: Use only the concepts discussed in this class. You do not need to know anything about these specific programs to answer this question. If it helps you to think of these simply as “Good 1” and “Good 2” that is fine.



*Scenario 2 (Cash Assistance) is likely to result in the most people choosing the all leisure/no work point. At this point, the price of leisure is zero – people do not gain additional consumption by working more hours (having less leisure) and there is no reason to ever choose a point on the “flat” part of the budget constraint. On this flat part of the budget constraint there is no cost (in terms of foregone consumption) of having one more hour of leisure and working one fewer hour. Note that it is not enough to say that this scenario provides consumption even if you are not working and therefore people should not work. It is that the slope is equal to zero, so this “corner solution” point will be optimal for people with a wide range of preferences. People with high MRS (strong preference for leisure vs. consumption) and moderate MRS (moderate preference for leisure vs. consumption) will both choose this point.*

*Scenario 3 (EITC) is likely to result in the fewest people choosing the all leisure/no work point. At this point, the price of leisure is very high – people give up a lot of consumption by having one more hour of leisure. The slope of the budget line gives the ratio between the price of leisure and the price of consumption. Since the slope of the EITC budget line is very steep at the all leisure/no work point, this implies that the price of leisure is high at that point. Recall that the optimal bundle is where the slope of the budget line is tangent to the indifference curve. The only people for which this condition would hold at high levels of leisure given the steep budget line are those with a very high MRS – those who have a very strong preference for leisure and would be willing to give up a lot of consumption for one more hour of leisure.*

*Scenario 1 is somewhere in the middle: the price of leisure is greater than zero but not as high as in scenario 3.*