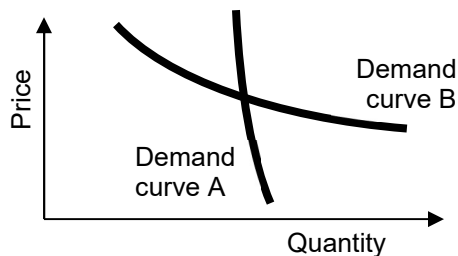


EXAMINATION 2 VERSION A
"Applications of Supply and Demand"
March 20, 2024

INSTRUCTIONS: This exam is closed-book, closed-notes. Simple calculators are permitted, but graphing calculators, calculators with alphabetical keyboards, cell phones, and wireless devices are NOT permitted. Numerical answers, if rounded, must be correct to at least 3 significant digits. 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, 14 pts total]

- (1) Which demand curve below is *less* elastic?
- a. Demand curve A.
 - b. Demand curve B.
 - c. Both have the same elasticity because they pass through the same point.
 - d. Cannot be determined from information given.



- (2) The units of measure for the price elasticity of demand for gasoline are
- a. gallons per dollar.
 - b. dollars per gallon.
 - c. The elasticity is a pure number and has no units of measure.
 - d. percent.
- (3) It takes time for consumers to adjust their lifestyles to changes in electricity prices. Therefore, the long-run demand for electricity is
- a. more elastic than the short-run demand.
 - b. less elastic than the short-run demand.
 - c. just as elastic as the short-run demand.
 - d. Elasticity of demand is not related to time for adjustment.

- (4) The price elasticity of demand for organic vegetables has been estimated to be about -2 . If the price of organic vegetables rises, then the amount of money consumers spend on organic vegetables will
- a. increase.
 - b. decrease.
 - c. remain constant.
 - d. cannot be determined from information given.

- (5) In recent years, the supply of soybeans in Latin America has shifted right due to expansion of agriculture there. Because soybeans are traded internationally, this should cause the price of soybeans in the United States to
- a. rise.
 - b. fall.
 - c. rise or fall, depending on the shapes of the demand and supply curves.
 - d. remain constant.

The next three questions refer to the following demand and supply schedules for soybeans in two countries.

	Country X		Country Y	
Price	Q _D	Q _S	Q _D	Q _S
\$1	60	30	85	25
\$2	50	50	80	30
\$3	40	70	75	45
\$4	30	90	70	50
\$5	20	110	65	55
\$6	10	130	60	60
\$7	0	150	55	65

(6) In the absence of international trade, Country X's equilibrium price of soybeans would be

- a. \$2.
- b. \$3.
- c. \$4.
- d. \$5.
- e. \$6.

(7) With international trade, the equilibrium price of soybeans in both countries would be

- a. \$2.
- b. \$3.
- c. \$4.
- d. \$5.
- e. \$6.

(8) Who in Country X benefits from international trade in soybeans?

- a. Buyers in Country X.
- b. Sellers in Country X.
- c. Both buyers and sellers in Country X.
- d. Neither buyers nor sellers in Country X.

(9) Suppose there is a change in government policy affecting the automobile industry. Which of the following outcomes would be a *Pareto improvement*?

- a. Producers gain \$5 billion while consumers lose \$10 billion.
- b. Producers gain \$10 billion while consumers lose \$5 billion.
- c. Producers gain \$5 billion while consumers are unaffected.
- d. Both (b) and (c).
- e. All of the above.

(10) Suppose the price of gold were higher in New York than in Los Angeles, initially. Arbitrage would then *tend to*

- a. raise the price of gold in both cities.
- b. lower the price of gold in both cities.
- c. raise the price of gold in New York and lower the price in Los Angeles.
- d. raise the price of gold in Los Angeles and lower the price in New York.

(11) Suppose the price of watermelons is \$7 in Kansas City and the cost of shipping a watermelon between Des Moines and Kansas City is \$2. Markets are *in equilibrium* if the price of melons in Des Moines is

- a. \$1.
- b. \$4.
- c. \$8.
- d. \$10.

(12) Arbitrage guarantees that people in Denver and Chicago pay similar prices for

- a. houses.
- b. gold.
- c. haircuts.
- d. gravel.
- e. all of the above.

(13) A quota (or legal maximum quantity) on *buying* ivory would cause its price to

- a. rise.
- b. fall.
- c. rise or fall, depending on the shapes of the demand and supply curves.
- d. remain constant.

(14) Suppose the price elasticity of supply for items sold on the internet in Iowa is 8.0 and the price elasticity of demand is -1.0. If Iowa imposes a tax on internet sales,

- a. sellers will pay most of the tax.
- b. buyers will pay most of the tax.
- c. sellers and buyers will each pay half of the tax.
- d. Answer depends on which side is legally required to remit the tax to the government.

II. Problems: Please insert your answer to each question in the box provided. Use margins and graphs for scratch work. Only the answers in the boxes will be graded. Work carefully—partial credit is not normally given for questions in this section.

(1) [Calculating elasticities: 2 pts] Suppose that if the price of gasoline is \$5 per gallon, the typical driver uses 7 gallons per week, but if the price of gasoline is \$3 per gallon, the typical driver uses 9 gallons per week. Compute the price elasticity of demand for gasoline using the “arc-elasticity” formula.

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(2) [Cross-price elasticity of demand: 4 pts] Suppose that when the price of hamburger meat rises by 25 percent, the quantity of ketchup purchased falls by 10 percent.

- From the information above, are hamburger meat and ketchup *substitutes* or *complements* ?
- Compute the cross-price elasticity of demand for ketchup with respect to the price of hamburger meat. (Full credit requires correct sign.)

(3) [Income elasticity of demand: 4 pts] Suppose that when consumers’ income rises by 5 percent, the quantity of macaroni-and-cheese dinners purchased falls by 1 percent.

- From the information above, are macaroni-and-cheese dinners an *inferior good*, a *necessary good*, or a *luxury (or superior) good* ?
- Compute the income elasticity of demand for macaroni-and-cheese dinners. (Full credit requires correct sign.)

(4) [Income elasticity of demand: 8 pts] According to the Consumer Expenditure Survey, the following are budget shares for low-income and high-income households. For each good, indicate whether it is a necessary good or a luxury good (sometimes called a “superior good”). Also indicate whether the income elasticity of demand is greater or less than one.

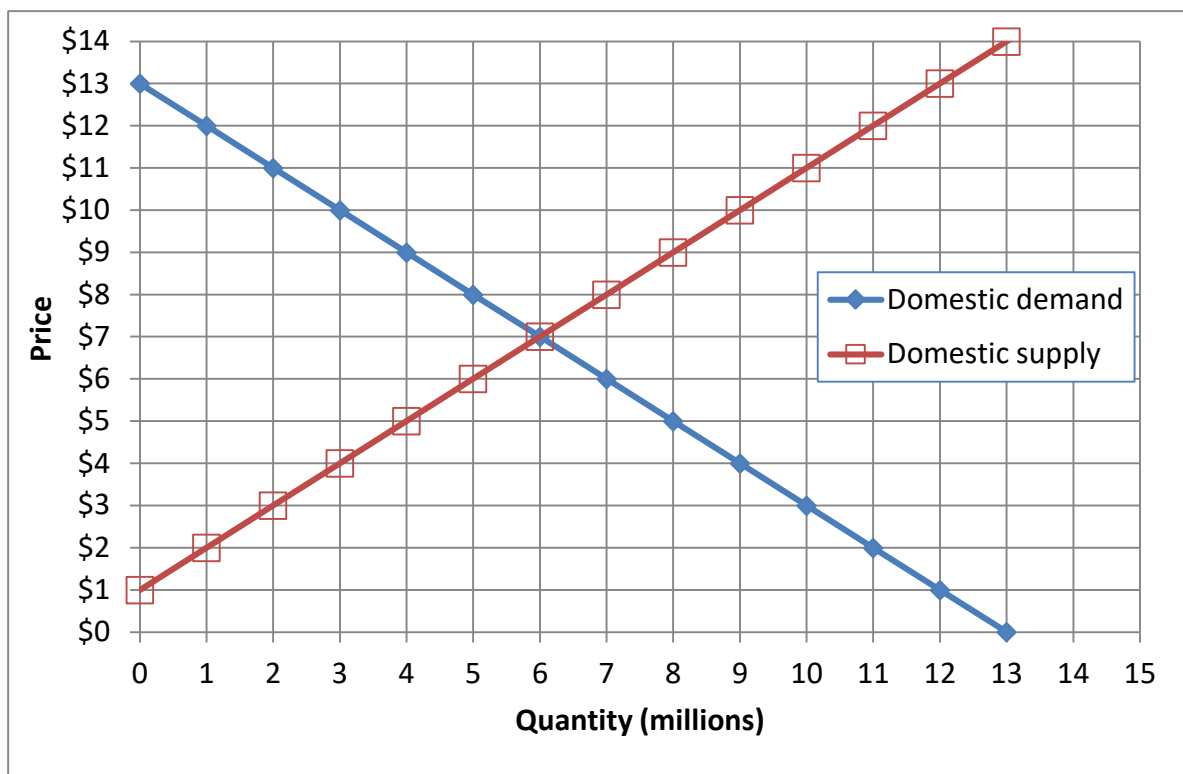
Good	Budget share, low income	Budget share, high income	<i>Necessary good or luxury good?</i>	<i>Income elasticity of demand greater than one or less than one?</i>
a. Housing	41.0%	30.2%		
b. Vehicle purchases	4.3%	6.9%		

(5) [Using price elasticity of demand: 10 pts] Suppose AMTRAK *raises* train fares by 5%. Suppose the price elasticity of demand for train travel is -1.2. Assume everything else affecting demand for train travel remains constant.

- According to the information above, is demand for train travel *elastic*, *inelastic*, or *unitary-elastic*?
- As the price rises, will the number of train fares sold *increase*, *decrease*, or remain *constant*?
- ... by approximately how much?
- Will the total revenue received by AMTRAK *increase*, *decrease*, or remain *constant*?
- ... by approximately how much?

%
%

(6) [Welfare analysis of international trade: 18 pts] Domestic supply and demand for TV remote controllers in a particular country are shown in the following graph.



- a. At first, international trade in TV remotes is not permitted. Find the equilibrium price without international trade.

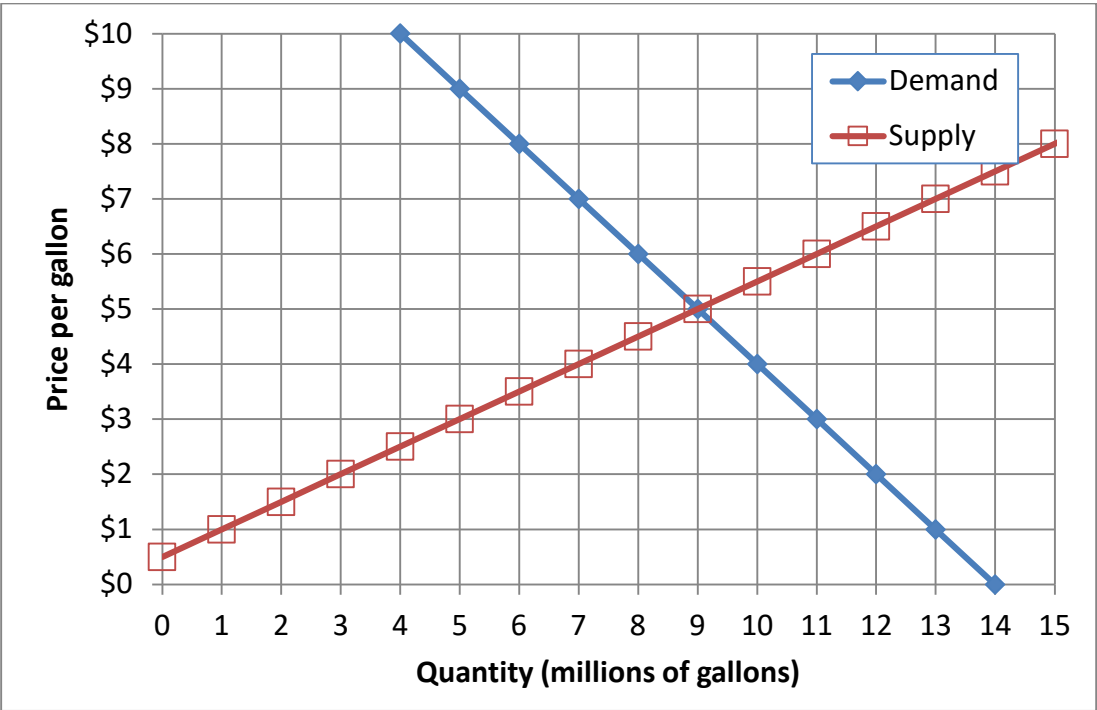
\$

Then this industry is opened to international trade and the international price of TV remotes turns out to be \$5.

- b. Will this country now *export* or *import* TV remotes?
- c. How many?
- d. Does consumer surplus in this country *increase* or *decrease* from international trade in TV remotes?
- e. By how much?
- f. Does producer surplus in this country *increase* or *decrease* from international trade in TV remotes?
- g. By how much?
- h. Does total social welfare in this country *increase* or *decrease* from international trade in TV remotes?
- i. By how much?

million
\$ million
\$ million
\$ million

(7) [Welfare analysis of market controls: 18 pts] The graph below shows the market for milk.



a. Find the equilibrium price without government intervention.

\$

Suppose the government imposes a price ceiling (or legal maximum price) of **\$ 3 per gallon**. No milk may be sold for a price higher than the price ceiling.

b. How much milk will actually be sold?

million gallons

c. Will there be *excess demand*, *excess supply*, or *neither*?

d. How much?

million gallons

e. Does producer surplus *increase*, *decrease*, or *remain constant* because of the price ceiling, as compared to the market without government intervention?

f. By how much?

\$ million

g. Does consumer surplus *increase*, *decrease*, or *remain constant* because of the price ceiling, as compared to the market without government intervention? (Assume optimistically that milk is purchased by those consumers who have the highest willingness-to-pay.)

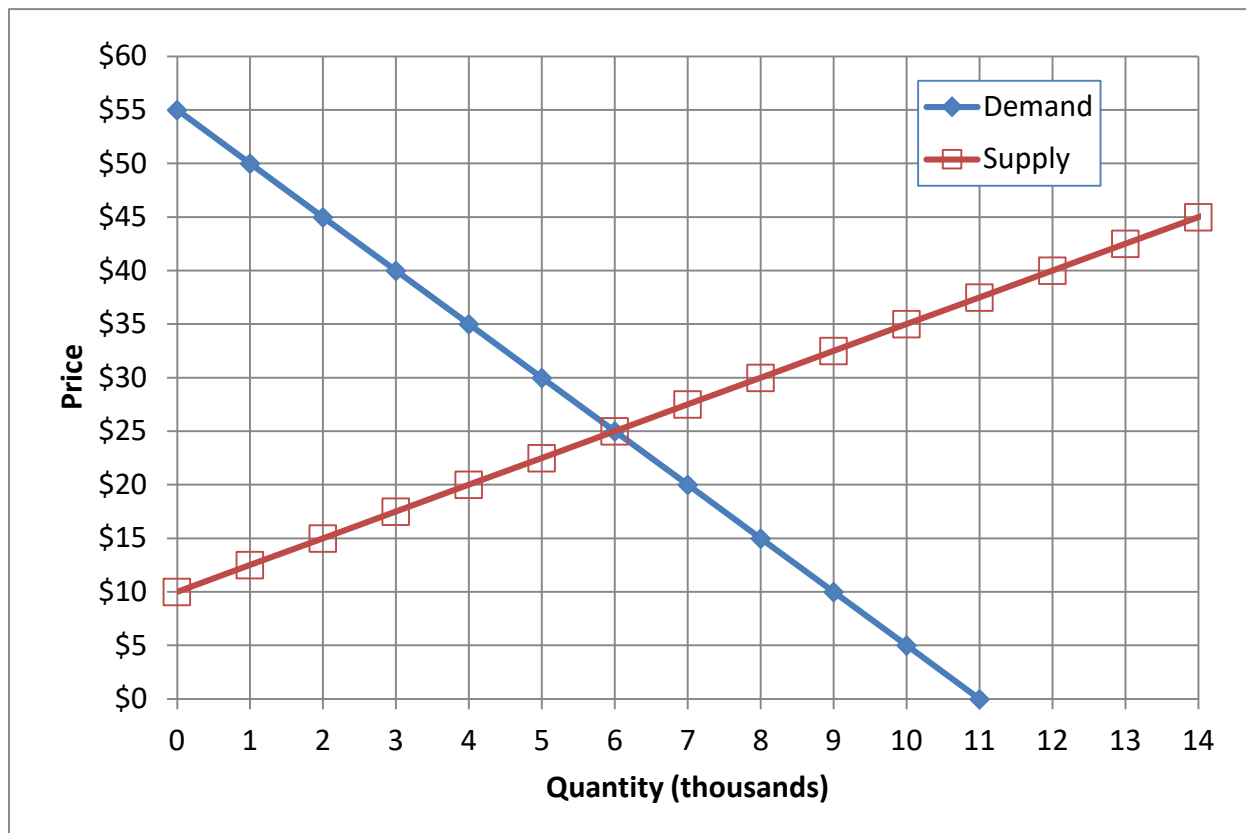
h. By how much?

\$ million

i. Compute the deadweight social loss caused by the price ceiling.

\$ million

(8) [Welfare analysis of tax or subsidy: 18 pts] The graph below shows the market for baseball bats. Note that the price axis is marked off at intervals of \$5.



Suppose the government imposes an excise **tax of \$ 15** per baseball bat.

- Compute the equilibrium quantity sold.
- Compute the equilibrium net price received by sellers (excluding the tax).
- Compute the equilibrium total price paid by buyers (including the tax).
- Does producer surplus *increase, decrease, or remain constant* because of the tax?
- By how much?
- Does consumer surplus *increase, decrease, or remain constant* because of the tax?
- By how much?
- Compute the total tax revenue collected by the government.
- Compute the deadweight social loss caused by the tax.

	thousand
\$	per baseball bat
\$	per baseball bat
\$	thousand
\$	thousand
\$	thousand
\$	thousand

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

- (1) A study¹ found that when tobacco cigarette prices increased by 10 percent, use of marijuana by young people *decreased* by about 12 percent. (Ignore the graph below.)
 - a. Does this indicate that marijuana and tobacco cigarettes are *substitutes* or *complements*? Why?
 - b. Compute the cross-price elasticity of demand for marijuana with respect to the price of cigarettes.
- (2) Consider the following statement. "The higher the tax rate, the more tax revenue the government collects." Do you agree or disagree? Justify your answer with a supply-and-demand graph. Label both axes and all curves.

Please circle the question you are answering. Write your answer below. Full credit requires correct economic reasoning, legible writing, good grammar including complete sentences, and accurate spelling.



[end of exam]

¹ Frank J. Chaloupka, Rosalie Liccardo Pacula, Matthew C. Farrelly, Lloyd D. Johnston, Patrick M. O'Malley, "Do Higher Cigarette Prices Encourage Youth to Use Marijuana?" NBER Working Paper No. 6939, February 1999.