ECON 180 - Regulation & Antitrust Policy
Drake University, Spring 2015
William M. Boal

Signature: ______________________________

Printed name: ______________________________

FINAL EXAMINATION VERSION B

INSTRUCTIONS: This exam is closed-book, closed-notes. Simple calculators are permitted, but graphing calculators or calculators with alphabetical keyboards are NOT permitted. Mobile phones or other wireless devices are NOT permitted. Points will be subtracted for illegible writing or incorrect rounding. Point values for each question are noted in brackets. Maximum total points are 200.

I. Multiple choice: Please circle the one best answer to each question. [1 pt each, 22 pts total]

(1) In the United States, "monopolization" is illegal under the
a. Sherman Act Section 1.
b. Sherman Act Section 2.
c. Clayton Act.
d. Federal Trade Commission Act.

(2) An action by firms that is *per se* illegal is
a. always illegal regardless of circumstances.
b. may be illegal if it appears to lessen competition.
c. may be illegal if it increases the firm's profit.
d. may be illegal if it decreases other firms' profits.

(3) Under U.S. law, price-fixing is illegal
a. *per se*, except in industries Congress has exempted.
b. if price is raised significantly above marginal cost.
c. if total market quantity is reduced significantly below the competitive quantity.
d. if significant deadweight loss can be shown.

(4) Under the Department of Justice's corporate leniency program, amnesty can be given to
a. the first cartel member that cooperates with the government investigation.
b. the last cartel member that cooperates with the government investigation.
c. any cartel participants that cooperate with the government investigation.
d. any cartel participants that agree to leave the cartel.

(5) Which hypothesis claims that higher industry concentration is *not* associated with a loss of social welfare?
a. collusion hypothesis.
b. differential efficiency hypothesis.
c. Both of the above.
d. None of the above.

(6) The theory of contestable markets concludes that, even if a market is a natural monopoly, the equilibrium price in the market will
a. be greater than average cost.
b. be equal to average cost.
c. fall after another firm enters the market.
d. rise after another firm enters the market.

(7) Suppose a gasoline distributor in the Midwest merged with a gasoline distributor in the South. This would be an example of a
a. horizontal merger.
b. vertical merger.
c. conglomerate merger for product extension.
d. conglomerate merger for market extension.
e. pure conglomerate merger.

(8) According to the DOJ-FTC *Horizontal Merger Guidelines*, the ability of a hypothetical monopolist to impose a "small but significant and nontransitory increase in price" should be used to
a. compute a merged firm's Lerner index.
b. define the extent of a market.
c. decide whether a merger should be opposed.
d. compare with any cost savings.
e. regulate price in a market.
f. distinguish vertical, horizontal, and conglomerate mergers.

(9) The view that vertical mergers may be a problem, because models based on game theory show that vertical mergers may simultaneously be profitable and decrease welfare, is called the
a. Traditional or Harvard School view.
b. Chicago School view.
c. Post-Chicago view.
d. Supply-side view.

(10) Examples of vertical restraints do *not* include
a. tying.
b. predatory pricing.
c. territorial restraints.
d. exclusive dealing.
e. resale price maintenance.

(11) To be convicted of violating the Sherman Act Section 2, firms must possess monopoly power and
a. show intent to monopolize a market.
b. have higher cost than any potential rival.
c. enjoy above-normal profit.
d. have lower cost than any potential rival.

(12) According to the Areeda-Turner (1975) rule, a firm should be presumed to be engaging in predatory pricing if its price is less than its
a. marginal cost
b. average variable cost.
c. average fixed cost.
d. average total cost.

(13) Regulation serves only the industry regulated according to the
a. Stigler-Peltzman theory of regulation.
b. Becker theory of regulation.
c. "normative analysis as positive theory" of regulation (also called the "public interest" theory of regulation).
d. "capture theory" of regulation.

(14) Social deadweight loss is minimized when price is set equal to
a. marginal cost.
b. average fixed cost.
c. average variable cost.
d. average total cost.

(15) The *rate base* for a regulated public utility is
a. the value of its plant and equipment.
b. the monthly service fee for its lowest-price customers.
c. the number of customers it serves.
d. the minimum usage price it may charge.

(16) According to Kahn's definition, the cost of an input that can be used to produce either of several outputs, but with a tradeoff, is called
a. an average cost.
b. a fixed cost.
c. a common cost.
d. a joint cost.
e. a fully-distributed cost.

(17) A decline in the so-called "fixed cost" of production will
a. shift the average cost upward.
b. alter the marginal cost curve.
c. increase the efficient scale of operation.
d. decrease the efficient scale of operation.

(18) If a regulated monopoly is required to price Service A above average cost and Service B below average incremental cost, then entry will occur only in the market for Service A. This phenomenon is called
a. predation.
b. economies of scope.
c. cream-skimming.
d. increasing returns.

(19) Deregulation of an industry previously subject to entry restrictions is likely to cause
a. exit of some existing firms.
b. entry of new firms.
c. both (a) and (b).
d. neither (a) nor (b).

(20) After airline deregulation, fares *fell* for
a. short-haul routes (less than 500 miles).
b. long-haul routes (more than 1000 miles).
c. all routes.
d. no routes.

(21) One kind of market failure occurs when one side of the market (typically consumers in markets for consumer goods or workers in labor markets) is unaware of risks associated with a good or a job. This kind of market failure is called
a. market power.
b. imperfect information.
c. externalities.
d. irrationality.

(22) The value of a statistical life (VSL) equals the
a. present discounted value of a person's lifetime earnings.
b. present discounted value of a person's lifetime earnings less consumption.
c. present discounted value of taxes paid during a person's lifetime.
d. none of the above.

II. Problems: Insert your answer to each question below in the box provided. Feel free to use the margins 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) [Intro to antitrust: 4 pts] Fill in the blanks: Antitrust policy is enforced by two U.S. federal agencies:

the ___________________________ Division of the ____________________________ Department,

and the __________________________ __________________________ Commission.

(2) [Profit maximization while taking price as given: 10 pts] Suppose the market price of an item is \$7 and a firm that produces that item has a total cost function given by $TC(q) = 2q + (q^2/100)$. Assume the firm takes price as given. Answer the following questions, showing your work and circling your final answers.

a. How much output (q) should the firm produce to maximize profit?

b. How much profit will the firm enjoy?

(3) [Monopoly, profit maximization: 14 pts] Suppose a monopolist has total cost function given by $TC(Q) = 3Q + (Q^2/100)$. This monopolist faces a demand curve given by $P = 9 - (Q/50)$. Show your work in the boxes below and circle your final answers.

a. Find the monopolist's marginal cost function.

b. Find the monopolist's average cost function.

c. Find the monopolist's marginal revenue function.

d. Compute the monopolist's profit-maximizing level of output Q*.

e. Compute the monopolist's profit-maximizing price P*.

[Problem continues on next page.]

f. Compute the monopolist's profit.

g. Compute the social deadweight loss caused by the monopolist. (Use the graph for scratch work.)

(4) [Cournot duopoly: 14 pts] Suppose a market is served by only two firms: Acme Products Company and Best Products Company. Suppose two firms form a *symmetric Cournot duopoly*, each firm setting its own quantity while taking the other firm's quantity as given. Let q_A = Acme's quantity and q_B = Best's quantity, so that total market quantity $Q = q_A + q_B$. The market demand curve is $P = 14 – (Q/20)$. Each firm has constant marginal and average cost equal to \$2. Circle your final answers. Use the space at the bottom of the next page for scratch work.

a. Find an expression for Acme's revenue, as a function of its own quantity and the quantity produced by the other firm: $Rev_A(q_A,q_B)$. [Hint: By definition, $Rev_A = P\ q_A$. Here, replace P by the equation for the demand curve, and then replace Q by $(q_A + q_B)$.]

b. Find an expression for Acme's marginal revenue, as a function of its own quantity and the quantity produced by the other firm: $MR_A(q_A,q_B)$. [Hint: $MR_A = dRev_A / dq_A$.]

c. Find an expression for Acme's reaction function (or best reply function), showing how much Acme will produce for any given level of quantity set by the other firm: $q_A^* = f(q_B)$. [Hint: Set MR_A = MC and solve for q_A as a function of q_B .]

d. Assume the equilibrium is symmetric (that is, assume $q_A^* = q_B^*$) and compute Acme's equilibrium quantity q_A^*.

Question continues on next page.

e. Compute total market quantity Q* and the equilibrium price P*.

f. Compute the Lerner index of market power [(P-MC)/P].

g. Compute the social deadweight loss from Cournot duopoly.

(5) [HHI and merger guidelines: 12 pts] Suppose the market shares in an industry are as follows.

Firm	#1	#2	#3	#4	#5	#6	#7	#8	#9
Market share	20%	20%	10%	10%	10%	10%	10%	5%	5%

a. Compute the current value of the Hirschman-Herfindahl index.

b. Under the 2010 DOJ-FTC *Horizontal Merger Guidelines*, would this industry be classified as "unconcentrated," "moderately concentrated," or "highly concentrated"?

Now suppose Firm #7 were to merge with Firm #8.

c. Compute the postmerger value of the Hirschman-Herfindahl index.

d. Under the 2010 *Guidelines*, would this industry now be classified as "unconcentrated," "moderately concentrated," or "highly concentrated"?

e. On the basis of these HHI calculations alone, would the government conclude that this merger
(i) is "presumed to be likely to enhance market power," or
(ii) "raises significant competitive concerns," or
(iii) is "unlikely to have adverse competitive effects,"
according to the 2010 *Guidelines?*

f. Why or why not?

(6) [Vertical merger for monopoly extension: 26 pts] Suppose an upstream monopoly company produces operating-system software used by competitive downstream computer manufacturers. The upstream firm has constant marginal cost (equal to average cost) of $MC_S = \$20$. Each computer requires exactly one copy of the software and \$300 of other inputs. Therefore the downstream computer industry has constant marginal cost (equal to average cost) of \$300 plus the price of software, P_S, which is set by the upstream monopolist. The key assumptions are

Marginal and average cost of software:	MC_S	$= AC_S = \$20.$
Marginal and average cost of computers:	MC_C	$= AC_C = \$300 + P_S$.
Demand for computers:	P_C	$= 600 - Q.$

a. [4 pts] Find the equation for the marginal revenue curve for computers. [Hint: If demand is linear, marginal revenue has the same vertical intercept, but twice the slope, as the demand curve.]

$MR_C =$

Now compare market outcomes under two scenarios: (i) upstream market is monopolized and downstream market is competitive, and (ii) upstream and downstream are served by a vertically-integrated monopoly.

(i) First suppose the upstream market (software) is **monopolized** but the downstream market (computers) is **perfectly competitive.**

b. [4 pts] Find the equation for the derived demand curve for software. [Hint: Since the market for computers is perfectly competitive, you may assume that $MC_C = P_C$.]

$P_S =$

c. [4 pts] Find the equation for the marginal revenue curve for software. [Hint: For linear demand curves, marginal revenue has the same vertical intercept, but twice the slope, as the demand curve.]

$MR_S =$

Now compute the quantity of software (and thus computers) sold Q, the price of software P_S, the upstream software monopolist's profit, the price of computers P_C, and the downstream computer firms' total profit. Insert your answers in column (i) in the **Table of Results** on the next page.

[Problem continues on next page.]

(ii) Second, assume the upstream and downstream industries are served by a **vertically integrated monopoly**. The marginal cost of computers for the vertically-integrated monopoly is therefore **MC = $300 + $20**.

Now compute the quantity of computers, the price of computers P_C, and the integrated monopolist's profit. Insert your answers in column (ii) of the Table of Results below.

Table of results [36 pts]	**(i) Upstream market monopolized, downstream market competitive**	**(ii) Vertically integrated monopoly**
Q = quantity of software (and computers)		
P_S = price of software	$	
Profit of upstream firm	$	
P_C = price of computers	$	$
Total profit of downstream firms	$	
Total upstream + downstream profits	$	$

(iii) Third, consider the policy implications.

d. [4 pts] Suppose initially that the upstream market (software) is monopolized and the downstream market (computers) is competitive. Then suppose the upstream firm proposed to merge with a downstream firm. Should the government try to block the merger? Why or why not?

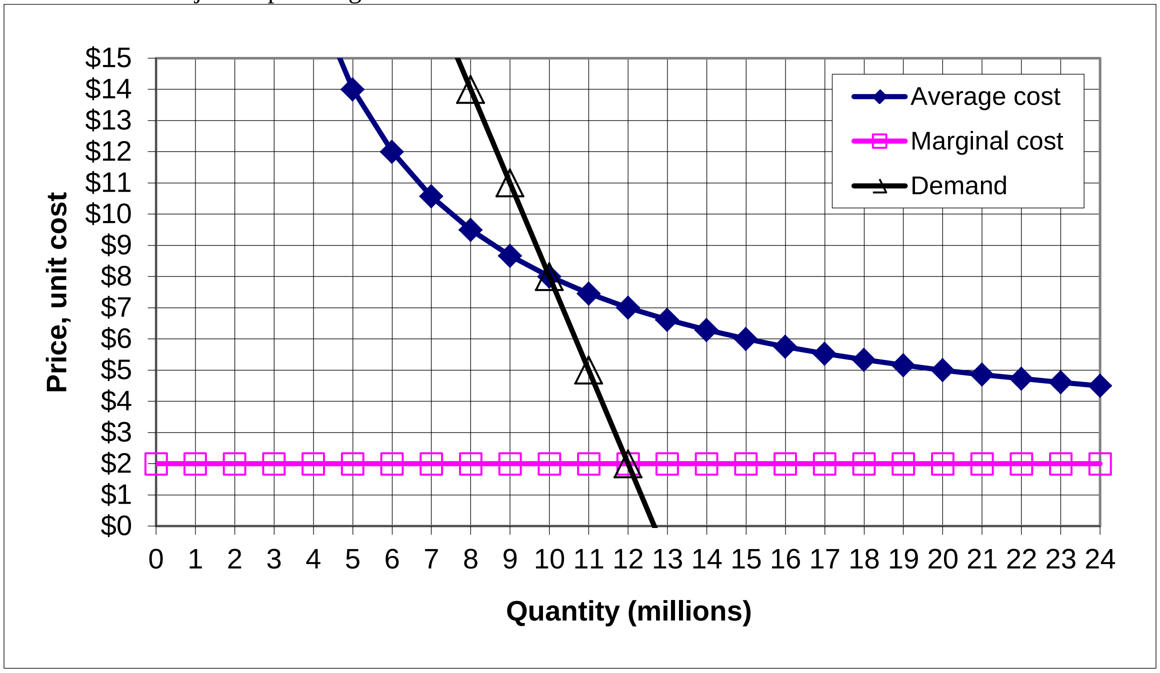
(7) [Cases: 10 pts] Consider the following list of important cases:

- Standard Oil v. U.S. (1911).
- U.S. v. U.S. Steel (1920).
- U.S. v. Alcoa (1945).
- U.S. v. United Shoe Machinery (1953).
- U.S. v. Grinnell Corps (1966).
- Utah Pie v. Continental Baking (1967).
- Berkey Photo v. Kodak (1979).
- MCI v. AT&T (1982).

Complete each sentence below with the appropriate case from this list.

a. The Supreme Court often makes the mistake of "protecting competitors instead of protecting competition," according to Justice Potter Stewart's dissenting view in the case of ...	
b. A Circuit Court decision admitted the right of a dominant firm to "compete aggressively" in the case of ...	
c. One remedy for monopolization is to break up the firm, as was done in the case of ...	
d. The Supreme Court stated that "the law does not make mere size an offense" in the case of ...	
e. The Seventh Circuit Court articulated the "essential facilities" doctrine in the case of ...	

(8) [Pricing with economies of scale: 20 pts] The following graph shows average cost, marginal cost, and market demand for a firm subject to price regulation.



First, suppose the regulator uses marginal-cost pricing.

a. What price would be set?	$
b. Does the firm experience economic profit, loss, or neither?	
c. How much?	$ million
d. Compute the social deadweight loss from this policy.	$ million

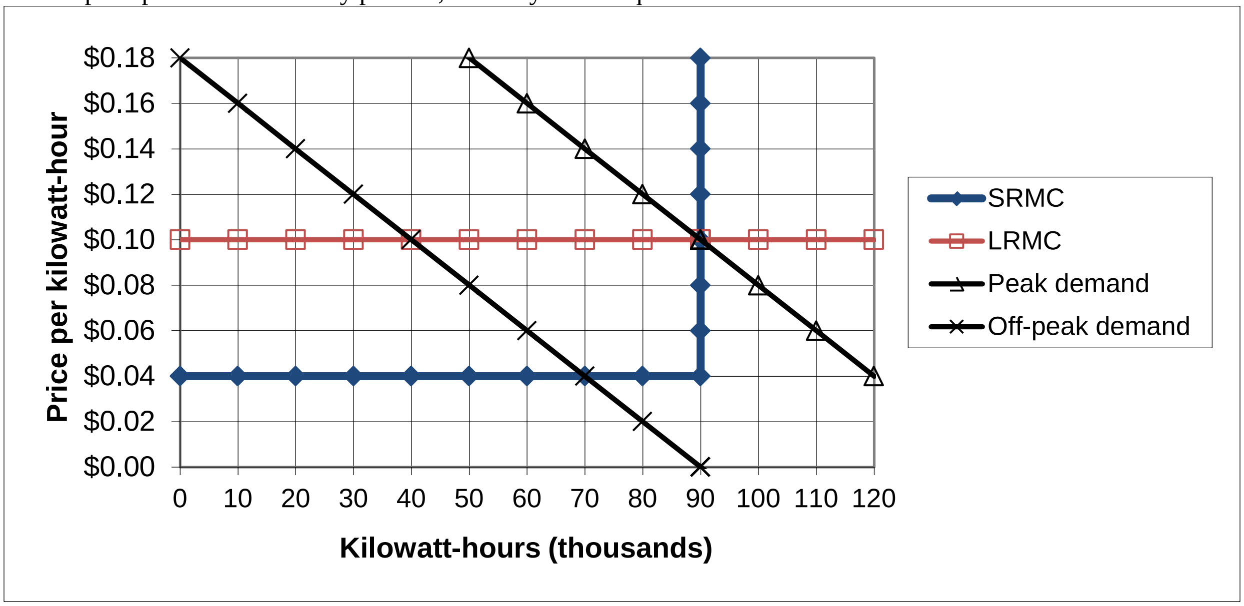
Second, suppose the regulator uses average-cost pricing.

e. What price would be set?	$
f. Does the firm experience economic profit, loss, or neither?	
g. How much?	$ million
h. Compute the social deadweight loss from this policy.	$ million

Third, suppose the regulator uses a two-part tariff to maximize social welfare (efficiency) while permitting the firm to break even.

i. What per-unit price would be set?	$
j. What per-customer fixed charge (or "entry fee") would be set? Assume the firm has **2** million customers with identical individual demands.	$

(9) [Peak-load pricing: 22 pts] Suppose cost and demand for electricity are given by the following graph. Costs are shown as short-run marginal cost (SRMC) and long-run marginal cost (LRMC) curves. LRMC includes the cost of building new capacity. Demands are shown as peak demand and off-peak demand. Assume for simplicity that peak and off-peak periods are the only periods, and they are of equal duration.



a. Explain in words why SRMC bends up vertically at 90 thousand kilowatt hours.

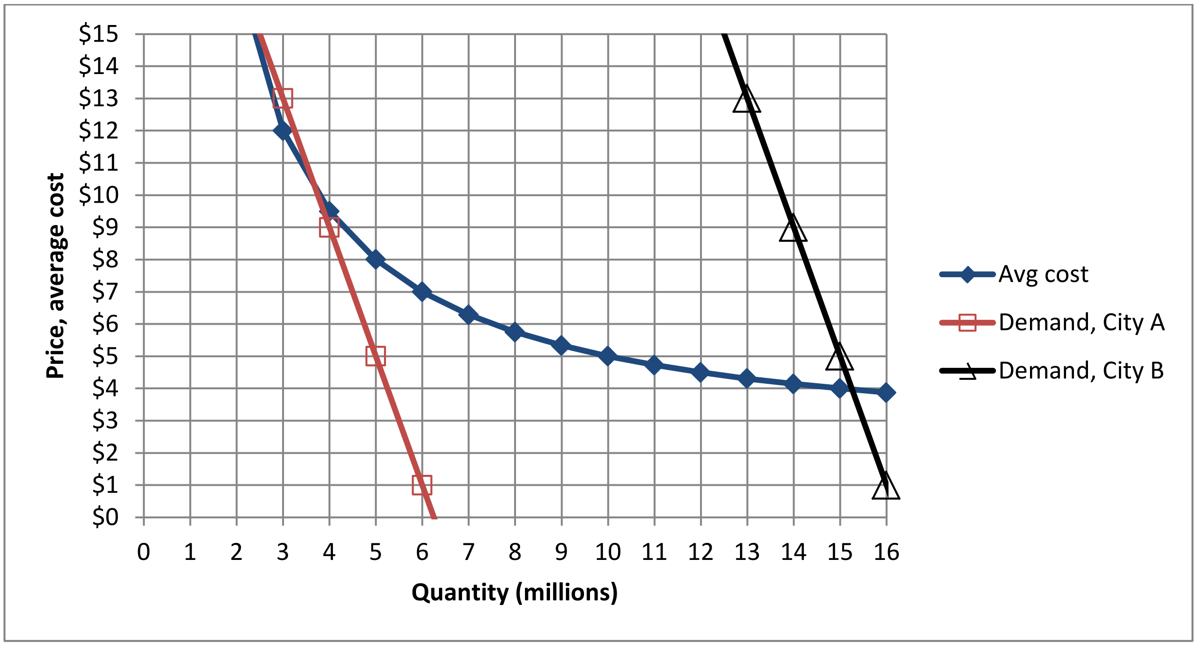
First, suppose efficient peak-load pricing is used.

b. Find the price of electricity during the peak period.	$ per kWh
c. Find the quantity of electricity demanded during the peak period.	thousand kWh
d. Find the price of electricity during the off-peak period	$ per kWh
e. Find the quantity of electricity demanded during the off-peak period.	thousand kWh

Now suppose instead a uniform price of **$ 0.08** per kilowatt-hour is used in both peak and off-peak periods.

f. Find the quantity of electricity demanded during the peak period.	thousand kWh
g. Find the quantity of electricity demanded during the off-peak period.	thousand kWh
h. Would generation capacity have to *increase*, *decrease*, or *stay the same* to accommodate uniform pricing?	
i. By how much? (Give the required *change* in generation capacity.)	thousand kWh
j. In the graph above, shade the areas representing social deadweight loss from uniform pricing.	
k. Compute the social deadweight loss from uniform pricing.	$ thousand

(10) [Cross-subsidization: 10 pts] Suppose that Acme Communications, a regulated firm, operates in two cities with different demand curves, but with the same average cost curve in each city, as shown below.



a. Is Acme Communications a natural monopoly? Why or why not?

Suppose the regulator imposes a price of **$ 5** in both cities.

b. What quantity will be demanded in each city?

c. Will Acme Communications enjoy a *profit* or a *loss* in each city?

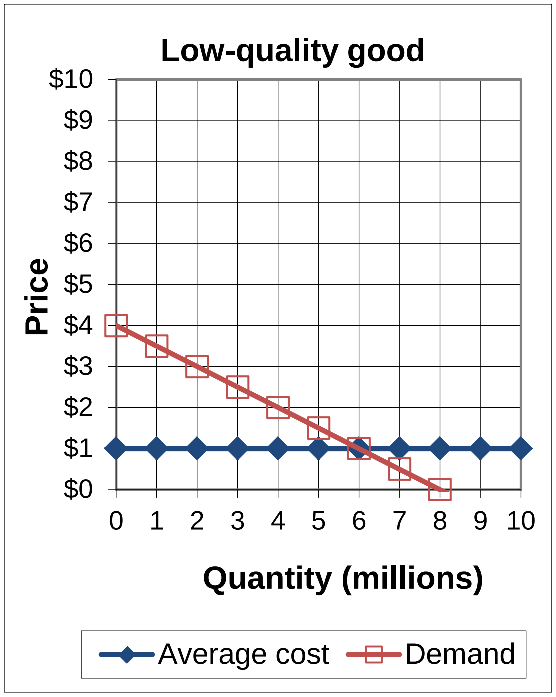
d. How much?

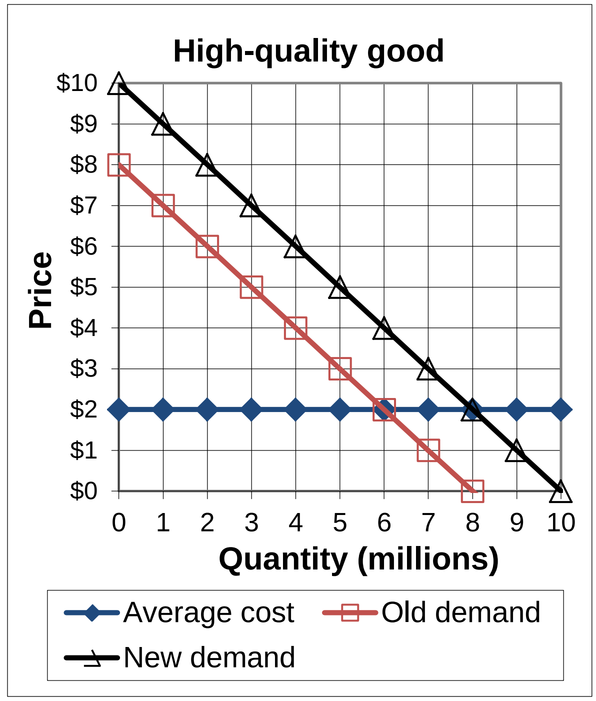
City A	City B
million	million
$ million	$ million

Suppose another firm has an average cost curve that is $0.50 *higher* than Acme Communications' average cost curve shown in the graph above. Further suppose that the regulator permits free entry into both cities. Note that only Acme's price is regulated.

e. Will the other firm enter City A, City B, both cities or neither city? Why?

(11) [Effect of regulation on quality: 14 pts] The following graphs show demand and supply for low-quality and high-quality versions of the same good. Assume average cost also equals marginal cost.





First, consider the market without regulation.

a. Find the quantity purchased of the low-quality good. — million

b. Assume the demand for the high-quality good is given by "Old demand." Find the quantity purchased of the high-quality good. — million

Suppose a price floor of **$ 6** is imposed on the low-quality good.

c. Find the new quantity purchased of the low-quality good. — million

d. Compute the social deadweight loss in the low-quality market from the price floor. — $ million

The low-quality and high-quality goods are substitutes, so demand for the high-quality good shifts right to "New demand." Suppose the same price floor of **$ 6** is now also imposed on the high quality good.

e. Find the new quantity purchased of the high-quality good. — million

f. Compute the social deadweight loss in the high-quality market from the price floor. — $ million

g. Compute the total cost of regulation—that is, the social deadweight loss in the low-quality market plus the social deadweight loss in the high-quality market. — $ million

(12) [Value of a statistical life: 6 pts] The following equation has been fitted to data on a large sample of workers:

$$\textit{annual earnings} = -2{,}678 + 7{,}541\,E + 38\,R$$

where E = total education in years, and R = annual occupational death rate per 100,000 workers.

a. Compute the value of a statistical life. $

Suppose a particular factory employs 1200 workers. Suppose an exhaust fan system, designed to remove harmful fumes, would cost $900,000 per year in the factory. It is estimated that the fan would reduce the factory's annual death rate from 3 in 10,000, to 2 in 10,000.

b. Compute the cost of the fan system per statistical life saved. $

c. Should the fan system be required?

(13) [Optimal stringency of regulation: 10 pts] Suppose the following data have been computed on alternative exposure standards for a certain chemical.

Exposure standard	Cost of compliance	Estimated number of lives saved	Marginal cost per life saved	Average cost per life saved
A. 0.5 mg/m^3	$1 million	2	$ million	$ million
B. 0.1 mg/m^3	$10 million	5	$ million	$ million
C. 0.05 mg/m^3	$22 million	8	$ million	$ million
D. 0.01 mg/m^3	$60 million	10	$ million	$ million

a. [4 pts] Compute the marginal cost per life saved for each exposure standard.
b. [4 pts] Compute the average cost per life saved for each exposure standard.
c. [2 pts] Assuming the value of a statistical life (VSL) is about $7 million, which is the efficient standard?

II. Critical thinking [6 pts]

Several companies have filed a complaint against Google in Europe, alleging among other things that Google's Android mobile phone operating system favors Google's own applications over those of its rivals.[1] Suppose you were an antitrust attorney for these companies making a similar complaint in the United States. What statutes (laws) and cases would you cite? Why?

[end of quiz]

[1] Vanessa Mock, "Microsoft Presses for Android Probe," *Wall Street Journal*, April 10, 2013, p. B4.