ECON 180 - Regulation & Antitrust Policy
Drake University, Spring 2015
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Signature: ______________________________

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TEST 5 VERSION B
"Oligopoly and Collusion"

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.

I. 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) [Game theory: 30 pts] Two firms are choosing designs for a new smart phone—either *round* or *angular*. Firm A has a strong reputation with consumers and whatever design it chooses will sell very well. Firm B is unknown to consumers, and its phones will sell well only if it chooses the same design as Firm A. If the firms choose different designs, Firm A will enjoy $15 million in profit while Firm B will have zero profit. If both firms choose the same design, Firm A will enjoy $10 million in profit while Firm B will enjoy $5 million. The diagram below is intended to show this game in normal (or strategic) form.

		Firm B	
		____________	____________
Firm A	____________	A gets $________ million. B gets $________ million.	A gets $________ million. B gets $________ million.
	____________	A gets $________ million. B gets $________ million.	A gets $________ million. B gets $________ million.

a. Complete the diagram by inserting the firms' *strategies*.

b. Complete the diagram by inserting the firms' *payoffs.*

c. What strategy is Firm A's best reply when Firm B plays "round"?

d. What strategy is Firm B's best reply when Firm A plays "angular"?

e. Which of the four outcomes of this game (if any) are Nash equilibria[1]?
Describe each equilibrium by listing the strategies played by each firm.

[1] Consider only Nash equilibria in pure (not randomized) strategies.

(2) [Cournot duopoly: 35 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 $P = 10 – (Q/100)$. Each firm has constant marginal and average cost equal to $4. 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.

(3) [Joint profit maximization: 25 pts] Suppose the two firms in the previous problem form a cartel to maximize the sum of their profits.

a. Find the cartel's marginal revenue function.

b. Compute the cartel's profit-maximizing level of output Q*.

c. Compute the cartel's profit-maximizing price P*.

d. Compute the cartel's Lerner index of market power [(P-MC)/P].

e. Compute the social deadweight loss from the cartel.

II. Critical thinking [10 pts]

Suppose a particular product has a price elasticity of demand of -2. The product is sold by two firms. Assume these two firms form a Cournot duopoly. However, we know the duopoly is not symmetric because Firm #1 has a market share of $S_1 = 0.60$, or 60 percent and Firm #2 has a market share of $S_2 = 0.40$, or 40 percent. But both firms charge the same price, $10.

a. Which firm must have higher marginal cost?

b. Compute the marginal costs of each firm.

[end of quiz]