1. *GreenClean*. Suppose that your research indicates the following Cournot reaction functions for quantities of two cleaning products, Clorox Green Works (denoted $q_C$) and Seventh Generation (denoted $q_{7G}$). (Assume there are no other green cleaning products.)

(a) Describe in words the meanings of the points $a$, $b$, $c$, and $d$.

(b) What is special about point $e$?

(c) Suppose the US Department of Justice found that the firms were producing quantities given by point $f$. Could any antitrust action be taken? Explain.

(d) Which of the following HHIs is most plausible if the firms are at point $f$, 1400, 5000, or 8200? Explain.

(e) Suppose that in a Congressional hearing, the CEO of Clorox states that there is substantial competition for Clorox’s green
cleaning products from its own and others’ non-green cleaning products. How does this relate to the “Cellophane fallacy” that “a monopoly creates its own competition?”

2. Home Depot. Suppose that Home Depot has 70% market share and Lowe’s has 30%.

(a) What is the HHI? What is the CR4?
(b) Suppose the firms are charging the monopoly price. Give two reasons why this might happen and what the US government could do under the law in each case.
(c) Suppose Home Depot decides that they will not sell to Tru-Green ChemLawn, a national lawn-care company. Can they just refuse to deal with them?
(d) Do you think that in a typical local market, Home Depot is a normative natural monopoly? Temporary or permanent? Or perhaps subadditive but unsustainable? Explain and draw a graph for your answer.
(e) Suppose the government decided to regulate Home Depot. Describe and illustrate with graphs two alternatives for this regulation, including prices, economic efficiency, and any revenue to or subsidies from the government.

3. DisplayAds. An article in Business Week, 3/14/2011, looks at the display ad industry (the bigger graphical ads on web pages) 3 years after Google purchased DoubleClick. Several issues are mentioned that relate to our class.

(a) The article points out that Facebook does not allow Google or anyone else to serve display ads on Facebook. Facebook serves its ads exclusively through its own vertically integrated ad division.
Suppose that ads can be served in a perfectly competitive market at a cost of 1¢ per click, either by Facebook’s ad division or by many other providers. There is no additional cost to Facebook of actually displaying the ad. Facebook has a monopoly on selling advertisers access to its users, so there is a downward-sloping demand for Facebook ads.

Draw Facebook’s monopoly diagram when it serves the ads itself, so there is a constant marginal cost of 1¢. Make it so the monopoly optimal price is $p_m = 3¢$ and the monopoly optimal quantity is $Q_m = 100$ (billion) clicks per day. What is Facebook’s monopoly operating profit?

(b) Now suppose that Facebook simply sold generic ad space, and allowed the competitive ad servers to serve up the ads at their marginal cost of 1¢ each. So now any advertiser would have to pay Facebook for display space and any one of the many ad servers for serving the ad. Assume every ad server is just as good as any other.

Redraw the monopoly diagram to show the demand for generic ad space on Facebook, which will be parallel shift 1¢ lower than before since there is no server service (ha ha) included. Remember that Facebook now has 0 marginal cost. What is the monopoly operating profit? Why is this called the “one” monopoly profit?

(c) Another issue mentioned is that Google uses cookies to track users, and that there are many bills in Congress to create a “do not track” registry so that people can more easily avoid these cookies. Suppose that Congress passes one of these bills are creates a national “do not track” registry. If the government called for bids on the franchise to manage this registry, should they ask for the highest dollar bid or the lowest cost per user registered? Show why using a diagram of price per
user registered and number of users registered.

4. Commodity Prices. Prior to the recession, commodity prices were rising fast, and now it is happening again. The Economist (2/26/11, pg. 68) says: “No one will be laughing on April 1st when Whirlpool and Electrolux raise the prices of their washing machines by a whopping 8-10%. The firms want to pass on the higher cost of inputs such as steel, which has risen by 20% in the past year. So far, American manufacturers have had to suck up most of the increase in the prices of their raw materials, with predictable consequences. Whirlpool’s profits have disappointed, and its share price has tumbled by nearly a third since April.”

(a) Draw the market diagram for washing machines, with Q = quantity of washers and p = price of washers. Let’s first imagine Whirlpool has a monopoly and that they have constant marginal costs equal to 100. Show their monopoly optimal quantity, monopoly price, monopoly operating profit, and the resulting deadweight loss.

(b) Draw a Cournot reaction function diagram for Whirlpool and Electrolux. Label the reaction functions of both firms, and the meaning of both intercepts. Show the Cournot equilibrium. To be more accurate, make it so that Whirlpool ends up producing about twice as much as Electrolux.
(c) Show how an increase in marginal cost to 120 affects both diagrams. For the monopoly diagram, the effect can be seen directly through the marginal cost curve. For the Cournot reaction function diagram, you need to think how the reaction functions would change.

(d) Is it possible that the cost increase could reduce the free-entry number of firms in this market? Presumably the two big firms mentioned above would not be the ones to leave, but smaller, weaker firms might. Show what would happen on a diagram with $N = \text{number of firms}$ on the horizontal axis and $\pi = \text{operating profits}$ on the vertical axis.

**Answers:**

1. *GreenClean_a.*

   (a) At point $a$, Seventh Generation's quantity is so high that Clorox does not produce anything. At point $b$, Clorox is producing 0 so Seventh Generation optimally responds with the monopoly quantity. We know it must be this way round and not the other because the monopoly quantity is smaller and more restrictive, whereas the quantity that pushes the other firm out of the market is much bigger.

   By the same reasoning, point $d$ is where Clorox drives Seventh Generation's quantity to 0, and point $c$ is where Seventh Generation has produced 0 so Clorox responds with the monopoly quantity.

   (b) Point $e$ is the one point which is on both reaction functions as the same time. Each company is doing the best it can given what the other company is doing. No company wants to change quantities. This is called the Cournot equilibrium.

   (c) Point $f$ is not on the reaction functions, it involves smaller-than-Cournot quantities for both firms, and thus probably
higher profits. This may be cause for concern. However, this could be the result of tacit collusion, which is legal, instead of explicit collusion which is illegal. If Clorox is not considered a “monopoly,” and if only tacit collusion is observed, the only antitrust remedy would be to prevent mergers (or to put conditions on them). But with its large market share, it is possible that Clorox will be deemed a monopoly, in which case the tougher remedies under the Sherman Act might come into force. In the most extreme case, Clorox might be split into separate companies.

(d) At point $f$, the quantity for Clorox is very high while the quantity for Seventh Generation is much lower. This means the market is heavily skewed toward Clorox, and the HHI will be indicative of a near monopoly. This is most consistent with the HHI of 8200.

(e) If Clorox really does have such a huge market share, it is likely that its high prices are forcing marginal consumers to buy non-green cleaners even though they would have wanted green cleaners at lower prices. Thus, the Cellophane fallacy may very well apply: the only reason the non-green cleaners are substitutes is the high prices being charged.

2. HomeDepot_a. Suppose that Home Depot has 70% market share and Lowe’s has 30%.

(a) $HHI = 70^2 + 30^2 = 5800$. $CR4 = 100\%$.

(b) There are at least three possible reasons:

i. The firms are explicitly colluding. This is per se illegal under the Sherman Act, and could lead to stiff fines or jail time. It is difficult to prove, however, because it requires evidence of communication to fix prices.
ii. The firms are tacitly colluding. This is not \textit{per se} illegal, but it is a bad form of industry conduct. If there were a merger proposal in the industry, the government could use tacit collusion as a reason for denying any further mergers.

iii. Home Depot effectively has a monopoly, and is setting a monopoly price. The government could potentially bring suit against Home Depot for misusing monopoly power under the Sherman Act. In the worst case for Home Depot, the company could be broken up. Probably a 70\% market share would not be high enough to make this a good case.

(c) Yes, Home Depot is a private company and it does not have a duty to sell to everyone. In the past, it might have been considered a “common calling,” but this type of legal obligation is no longer used. Since the Chicago School’s one monopoly profit theory, this type of refusal has been considered efficiency-enhancing unless there is evidence to the contrary.

However, if Home Depot provides any lawn-care services, this could be a case of vertical foreclosure in favor of Home Depot’s in-house services. In that case, the refusal to deal could be used against Home Depot in an antitrust case or in a merger approval.

(d) The main issue here is that Home Depot has a lot of fixed costs (store, parking lot, delivery logistics, etc.) that are spread over it output. That gives it economies of scale, the question is how much. If the economies of scale are substantial no matter what, then the AC curve slopes down forever and there is a permanent natural monopoly. If the economies of scale eventually run out and costs become constant, then the natural monopoly is temporary. If the economies of scale
not only run out, but diseconomies set in, then Home Depot could be subadditive but unsustainable. If there are enough diseconomies of scale, then Home Depot isn’t even subadditive.

(e) Several forms of regulation are possible:

i. Under marginal cost pricing, Home Depot is required to set price equal to marginal cost. This removes any inefficiency; there is no deadweight loss. The problem is that with economies of scale, marginal cost is below average cost, so Home Depot cannot cover its fixed costs. There will be a need for a government subsidy or some other measure to keep Home Depot from going bankrupt.

ii. Under average cost pricing, Home Depot would have its price regulated so equal average cost. The advantage is that Home Depot would then be self-liquidating – no subsidy would be needed. However, there would be some deadweight loss since quantity would be lower than under marginal cost pricing.

One way to implement average cost pricing is through rate of return regulation. This would attempt to determine Home Depot’s marginal cost and its capital or “rate base.” The price would then equal the marginal cost plus a “fair rate of return” on the rate base. The downside is that Home Depot would have an incentive to over-invest in capital in order to “pad the rate base.” This is called the Averch-Johnson effect.

Another way to implement average cost pricing is through a price cap. This would attempt to determine Home Depot’s average cost and then cap price at that level. Home Depot would have an incentive to figure out ways to cut costs, because they could keep the resulting profits.
iii. The government could sell Home Depot a monopoly franchise. It could ask Home Depot to bid to offer the lowest possible prices, which would be equivalent to average cost pricing, or it could simply ask for the highest possible bid, which would be equivalent to monopoly pricing but with the monopoly profit going to the government.

3. **DisplayAds.** An article in *Business Week, 3/14/2011*, looks at the display ad industry (the bigger graphical ads on web pages) 3 years after Google purchased DoubleClick. Several issues are mentioned that relate to our class.

(a) There is a standard monopoly diagram with marginal cost of 1¢ and optimal quantity of 100. The monopoly operating profit is then \( \pi_m = (3 - 1)100 = 200 \).

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(b) The demand curve in part (a) was a bundle of the demand for generic ad space and the demand for ad serving. The unbundled demand for ads on Facebook is just the same demand curve shifted down by 1¢. The marginal cost to Facebook is also shifted down 1¢ since the ad serving is now done by someone else.

Since both curves are shifted down by the same amount, the monopoly quantity is still 100, the price is 2¢, and the operating profit is \( (2-0)100=200 \).
This is called the “one” monopoly profit because there is only one monopoly here, that of Facebook over space on its pages. There is no additional monopoly power in ad serving; in fact this is a perfectly competitive service according to this problem. Thus, the one monopoly has the same value either way.

(c) If the contract were let to the highest bidder, then the highest possible profit occurs by definition when the firm charges the monopoly price \( p_M \). This creates deadweight loss shown by the shaded area in the diagram. Since the goal here is to make the service widely available, incurring DWL is problematic.

If instead the contract is let to the firm that bids the lowest user price, then the lowest profitable bid is \( p_{AC} \) where price equals average cost. This produces the smallest deadweight loss that still allows the firm to be self-liquidating, i.e. not needing a subsidy.

4. Sorry, no answer to CommodityPrices, just a practice problem.