1. Read the excerpt below from an article entitled “Railroads Getting in Better Shape for the Long Haul” that appeared in the Wall Street Journal on February 26, 1992.

The chief reason for the industry’s turnaround is big cuts in employment. Santa Fe, for instance, has slashed its work force to 14,000 from 23,000. Overall, rail industry employment has dropped nearly 50% to about 283,000 according to the Association of American Railroads. And railroads expect to save an additional $1 billion a year from new labor pacts that reduce train crews by one or two positions to only an engineer and a conductor. Railroads had been fighting for such contracts for decades.

The reason the railroads were fighting for decades to reduce train crews is because technological innovations that occurred in the early 1970’s allowed railroads to automate which made some jobs done by the train’s crew obsolete. Suppose the graph below depicts the isoquants of a firm in the train industry prior to the early 1970’s and an isocost curve. Assume that the firm produces an output of Q’ and minimizes costs prior to the early 1970’s by employing 11 units of capital and 5 units of labor (where the isocost curve is tangent to the isoquant).

a) How has the technological innovations in the early 1970’s in the railroad industry affected the above graph? DEPICT ON THE GRAPH ABOVE AND EXPLAIN.

b) Using the graph above, explain how the existing labor contract in the 1970’s affected the firm’s ability to minimize costs. How has this changed with the new labor contract? DEPICT GRAPHICALLY.
c) Suppose the labor contract does not restrict how much labor the firm can employ and it is currently 1969 (so the firm’s isoquants are as depicted above). Assume that the firm has 6 units of capital (K) in the short run. If the cost of capital is $5 per unit and the cost of labor (L) is $20 per unit, what is the firm’s average total cost in the short run (SRATC) at an output of Q’? What is the firm’s average total cost at an output of Q’ in the long run (LRATC)? Based on the information above, depict on the graph below possible LRATC and SRATC curves for the firm (indicate the SRATC and LRATC at Q’).

2. The graph below depicts the isoquant curves for a particular firm (along with the output, in units, associated with each isoquant) where K denotes units of capital and L denotes units of labor.

Suppose the cost of capital is $10 per unit and the cost of labor is $30 per unit.

a) On the graph above, identify how much capital and labor a profit maximizing firm will employ in the long-run if the firm produces an output of 50 units? EXPLAIN. (I would like you to depict the appropriate isocost curve.)

b) What is the firm’s long-run average total cost associated with producing 50 units of output? SHOW CALCULATIONS.

c) If the firm has 10 units of capital which it cannot change in the short-run, what is the firm’s short-run average total cost associated with producing 50 units of output? SHOW CALCULATIONS.
3. You are the manager at Brueger bagels and must decide whether to open on Sunday. Your lease of the space costs you $6,000 a month. (Assume there are 30 days in the month.) If you open on Sunday, you would sell 1,000 bagels at a price of $.75 per bagel and 500 cups of coffee at a price of $1 per cup. The material (flour, onions, raisins, etc.) for each bagel costs you $.20 and the material for the coffee costs you $.30 per cup. To stay open on Sunday, you require 5 workers. Each worker costs you $100 per day. Assume the utilities used on a Sunday costs you $50. Should you open on Sunday?

4. The following table provides information on a firm’s costs.

<table>
<thead>
<tr>
<th>Output</th>
<th>AVERAGE FIXED COSTS</th>
<th>AVERAGE VARIABLE COSTS</th>
<th>AVERAGE TOTAL COSTS</th>
<th>MARGINAL COSTS</th>
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</table>

a) What is the marginal cost (MC) associated with the 1st unit of output? What is the marginal cost (MC) associated with the 4th unit of output?

b) Suppose the Total Fixed Costs (TFC) are $21. What is the average total cost (ATC) of producing 2 units of output?

5. Read the article below entitled “Big Salt Producer Says Winter Storms Are Mixed Blessing” and briefly discuss (two sentences and a graph will do) what it implies about the shape of Akzo’s short run cost curves. (Again, the idea is to relate it to the material discussed in class.)

Big Salt Producer
Says Winter Storms Are Mixed Blessing
Special to The Wall Street Journal
02/22/1994
The Wall Street Journal
PAGE B5D
(Copyright (c) 1994, Dow Jones & Co., Inc.)
AMSTERDAM -- The winter storms that battered parts of the U.S. have proved a mixed blessing for Akzo NV, the big Dutch chemical company.
Akzo is the largest producer of salt products in the U.S., including road salts. And with all the snow and ice this winter, salt has been selling like mad. But at the same time the extreme weather has made it harder for Akzo to do business.
"Yes, we're going to be more profitable because of the storms, but costs have also gone up," says Catherine Bolton, a spokeswoman for Akzo Salt in the U.S.
Akzo doesn't break out division sales, but analysts say the U.S. salt operations are substantial. The U.S. accounts for about one-
quarter of Akzo's annual worldwide sales of more than 16 billion guilders ($8.25 billion). Those sales totals exclude the company's recent acquisition of Nobel Industrier AB of Sweden.

Ms. Bolton says Akzo has shipped a third more road de-icing salt than usual so far this year, a total of 3.5 million tons of rock salt since Jan. 1.

"It has been an unprecedented winter, with record snowfall since Dec 15. We've had storm after storm after storm," she notes. But, she adds, "it costs more to transport the salt. And while we make more profit, we can't produce the salt as economically."

To replenish depleted customer stockpiles, Akzo has been hustling to move salt "to the market as quickly as needed. It's been like fighting a war," Ms. Bolton says.

To offset the problems of moving rock salt de-icers by road and rail, Akzo already has shipped a "couple thousand tons" of sea salt-based deicers via boats from its Caribbean unit at Bonaire.

Akzo has three rock salt mines in the U.S., with the main mine in Retsof, N.Y.

Akzo's U.S. salt operations got a big boost in 1987, when the company acquired Diamond Crystal Salt.

Akzo is scheduled to report its 1993 net profit next week, with analysts' estimates roughly between 525 million and 600 million guilders after extraordinary charges of more than 100 million guilders. That would be down from 1992's net profit of 646 million guilders on sales of 16.9 billion guilders.

6. The cost data of the Preservation Embalming Company has been partially entered in the table below. Please fill in the remaining entries in the table.

<table>
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<tr>
<th>Bodies Embalmed</th>
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Suppose the firm is currently producing an output of 11 units and making total revenue of $200.

a) What are the firm’s total fixed costs? Show calculations.

b) What are the firm’s profits? Show calculations.

c) Suppose the firm is able to sell two additional units of output to a particular consumer for a price of $32 (or $16 for each of the additional units). Assume that the revenue from the first 11 units remains at $200 even if the firm does sell these two additional units of output. How much will the firm’s profits change if they do sell these two additional units? Show calculations.
a) Suppose the firm maximizes profits by producing an output of 10. At this output, the firm’s total revenue is $146 and its profits are $20. If this is the case, what is the firm’s total fixed cost (TFC)? Show calculations.

b) If the firm’s total revenue increases from 100 to 110 by producing an output of 7 compared to an output of 6, how will the firm’s profits change from producing an output of 7 compared to an output of 6? Show calculations.