1. Chapter 12, questions for discussion 3. Since you are already committed to the leasing contract, the equipment is a fixed input. If the prime rate increases, which increases your cost of capital, this is a change in fixed costs, which you must pay no matter what you choose to produce. Therefore, the change in the rental rate should not affect your output decision, so you should not have reduced your production rate.

2. The production function is

\[ x = \frac{20KL}{K+L}, \]

and we have \( w = 1, r = 4 \), and \( K = 10 \). The short run production function is

\[ x = \frac{200L}{10+L}, \]

which gives us the labor requirement when we solve for \( L \):

\[ L = \frac{10x}{200-x}. \]

The total cost and marginal cost functions are then

\[ SRTC = wL + rK = \frac{10x}{200-x} + 40, \]

\[ SRMC = \frac{2000}{(200-x)^2}. \]

To get the short run supply function, set \( SRMC \) equal to the price:

\[ \frac{2000}{(200-x)^2} = p_x. \] (1)

To express the supply function in terms of output as a function of price, solve (1) for \( x \):

\[ x = 200 - \left( \frac{2000}{p_x} \right)^{1/2}. \]

3. (a) A tax on economic profits will have no effect on the firms’ behavior, either in the short run or the long run. Any choices that maximize economic profits will also maximize 90% of economic profits (if the tax rate is 10%), so capital, labor, and output decisions are unchanged. Therefore, the equilibrium
price and quantity is also unchanged. Note that economic profits are zero in the long run, so that there is no tax revenue in the long run. An economic profits tax cannot force a firm to exit the industry, because the tax is only paid if economic profits are received.

(b) Think of accounting profits as revenues minus out of pocket (labor costs). The opportunity cost of capital owned by the firm is counted against economic profits, but it is not counted against accounting profits. Start from a position of short run and long run equilibrium, without the tax. Firms are receiving zero economic profits, but the accounting profits are positive. In the short run, capital is fixed at $K$, so the difference between accounting profits and economic profits is fixed at $rK$. Therefore, whatever maximizes economic profits will also maximize accounting profits in the short run. Firms in Columbus will supply the same as before, so prices and quantities are unchanged. Firms in Columbus now receive negative economic profits, due to the tax payment. In the long run, the price remains the same as before, since minimum long run average cost for the firms outside of Columbus has not changed. The net result will be the same price and quantity as before in the market. Firms in Columbus cannot operate as before. Either all firms in Columbus move outside of the city to avoid the tax, or they exit the industry, allowing new firms to enter from outside Columbus. One other possibility might be for firms in Columbus to rent their capital rather than own it. That way, accounting profits would include the capital costs. In any event, the city of Columbus would receive zero tax revenues in the long run.

4.

\[
\begin{align*}
X^d &= 3200 - 100p_x \\
X^s &= 200p_x - 100
\end{align*}
\]

(a) The equilibrium price is found by setting demand equal to supply.

\[
3200 - 100p_x = 200p_x - 100, \text{ which implies } 3300 = 300p_x, \text{ or } p_x = 11.
\]

The equilibrium quantity is 2100.

(b) With a $1 per unit tax, marginal cost increases by 1, so the inverse supply curve shifts up by 1. The equation for the original inverse supply curve is found by solving for $p_x$

\[
p_x = \frac{x + 100}{200}.
\]

The new supply curve is

\[
p_x = \frac{x + 100}{200} + 1 = \frac{x + 300}{200}.
\]

Therefore, we have

\[X^s = 200p_x - 300.\]
The new equilibrium price solves

\[ 3200 - 100p_x = 200p_x - 300. \]

Solving for the price, we have

\[ p_x = \frac{3500}{300} = 11.67. \]

(c) The equilibrium quantity is \( 3200 - 100(11.67) = 2033.0 \). The price paid by consumers (demand price) is \( p_x = 11.67 \), and the price received by firms after tax (supply price) is 10.67.

(d) In the long run, the tax is paid entirely by consumers, because firms receive zero profits before the tax and zero profits after the tax. Assuming we started at long run equilibrium, minimum LRAC equals 11, so the initial long run supply curve is flat at that price. After the $1 tax, the new minimum LRAC equals 12, so the new long run supply curve is flat at that price. After the $1 tax, the long run equilibrium price goes up by $1. Since the demand curve has not changed, the effect of the tax on quantity is a reduction, as we move up the demand curve in the direction of higher price and lower quantity. At a price of 12, the new long run equilibrium quantity demanded is 2000.