Chapter 2

Problem 2:

a. S = 1.196. There are a number of ways to calculate S. The easiest is to use the formula S = AC(q)/MC(q). Doing so, gives you S = 256/214 = 1.196. Similarly, using the elasticity formula from Application 2.6, you get (1/8)/(214/2048) = .125/.1045 = 1.196.

b. The firm is experiencing economies of scale. The value of S is greater than one. Also, the AC falls from 262 to 256 while q increases from 7 to 8.

c. The value of S can be interpreted to read that for every one percentage increase in costs, output will increase by 1.196 percent.

Problem 4:

a. The production of shampoo exhibits economies of scale up until 2 units of output. After that, the production of shampoo exhibits diseconomies of scale. There are two ways to see this. One way is to simply graph AC for different values of q. For example,

q_S	AC
1	5
2	4
4	5
8	8.5

You can see that at first, AC falls as q increases from 1 to 2, but then AC increases after that. Another way is more mathematical. If you set AC= $4/q_s + q_s$ equal to MC = $2q_s$, you will find that when AC=MC, q_s=2. This implies, that AC is at a minimum when q_s=2. (Also, finding the first derivative of AC and setting it equal to zero gives the same outcome.)

b. Yes, it does exhibit economies of scale. For example,

q_T	AC
1	5
4	1.5
9	.778
16	.5
100	.14

As q increase, AC falls.

c. Yes. No matter what combination, it will always be $1 less expensive to make the products. Notice that $C(q_s,q_T)$ is $1 less than $C(q_s,0) + C(0,q_T)$. Note as the quantities become larger, this $1 difference, as a percentage of total costs, becomes somewhat trivial.