Question 3. Internalizing an Externality through Firm Merger [redacted]

A slaughterhouse, located upstream from a bourbon distillery, dumps waste parts of defunct animals into the stream so that the distillery must incur the costs of cleaning the H20 to the quality standard advertised on the bottle: "made from genuine Kentucky spring water". The relevant info:

PB is the price of bourbon, PB=7/unit
PM is the price of meat, PM=5/unit.
B= units of bourbon production
M= units of meat production
TCB= the total cost of producing bourbon, $TCB=.005B^2 + .1B + M$
TCM=the total cost of producing meat, $TCM=.005M^2 + .15M$.

Now for some questions.

Part 1. Individual Production Decisions

a. Assuming the bourbon producer cannot control the actions of the meat producer, so that meat enter the bourbon distillery's cost function as an externality, what is the bourbon-producer's profit-maximizing output level of bourbon? [redacted]

b. What are the bourbon producer's profits at this output level? [redacted]

c. What is the meat producer's profit-maximizing output level of meat? [redacted]

d. The meat producer's profits at this level? [redacted]

e. What is the total of the two firms' profits (the sum of your answers in (b) and (d)). [redacted]

f. Now assume the firms merge, becoming one company with two divisions. In this context, the costs of meat will be internal to the production decisions for both bourbon and meat. What is the profit-maximizing level of bourbon production in this context? (If you are surprised by this answer, notice that meat enters the bourbon cost function as a fixed cost). (2 points)

g. What is the profit-maximizing output level of meat? [redacted]

h. What now are the total profit from producing meat and bourbon? [redacted]

i. Explain the intuition behind the difference in your answer in (h) and (e). [redacted]

Note: the distinction between the decision problem of the single firms acting independently versus acting as a joint enterprise is analogous to the difference between having a bunch of different builders building houses in a subdivision, versus having one builder develop a subdivision. In this context, however, the issue is positive externalities.

Question 3. Internalizing an Externality through Firm Merger (continued)

For example, the positive externalities provided by trees, flowers, and other yard amenities that affect the overall neighborhood ambience, not to mention, shared goods such as swimming pools and tennis courts. The impact of these amenities on neighborhood home values can be fully captured in the price of homes if the subdivision is developed by a single developer. But multiple developers would not be able to capture the external value of these amenities on the value of homes adjacent to the one they are building, and on the rest of the neighborhood. Thus, one would predict an economically-inefficient (too low) level of amenity provision for subdivisions developed by a number of different builders, given the positive externalities involved.

Note also that architectural design features are more similar in subdivisions than in individually-developed plots. This greater homogeneity is partially explained by cost factors -- it is less costly for a single developer to replicate one style than to construct multiple homes of different styles. But there is also a positive neighborhood externality to having a group of homes of similar styles, which can be captured by a subdivision developer. (To see the dis-amenity of having multiple architectural styles, just take a walk in almost any Bloomington neighborhood within .5 kilometers of campus!). In short, there are both cost and value factors which explains the style and amenity pattern of subdivisions vs. singly-developed areas.

Of course, an alternative way to internalize the externality in the case of neighborhood development, as in the example of the meat producer and the bourbon distillery, would be governmental regulation. A zoning ordinance could be used to assure aesthetic neighborhood development. A pollution control regulation could restrict the pollution from the meat producer.

Question 4. S