1) True, False, Uncertain

1a) TRUE. Without a log calculator, this problem requires that you translate a percentage change in W to a percentage change in price, and then compare the resulting price change to the additional cost of $5. The percentage change in weight W is

\[
\frac{9-10}{10} = -0.10 = -10\%
\]

This gives an (approximate) percentage change in price of

\[
-0.893 \times -0.1 = 0.0893 = 8.93\%
\]

or an overall (approximate) change in price of

\[
0.0893 \times ($59.95) = $5.35
\]

This is more than the cost of $5 to change the weight, so the answer is TRUE, you should recommend this change.

Alternative 1: (Different Approximate Percentage Change) Suppose that you used a different base for the percentage change, namely

\[
\frac{9-10}{9} = -0.1111 = -11.11\%
\]

This gives an (approximate) percentage change in price of

\[
-0.893 \times -0.1111 = 0.0992 = 9.92\%
\]

or an overall (approximate) change in price of

\[
0.0992 \times ($59.95) = $5.947
\]

This is more than the cost of $5 to change the weight, so the answer is TRUE, you should recommend this change.

Alternative 2: (Exact Solution) With a log calculator, you can directly compute

\[
-0.893 \times (\ln 9 - \ln 10) = 0.0941 = 9.41\%
\]

We solve for the new price \(P^*\) as

\[
\ln P^* - \ln 59.95 = 0.0941, \text{ or } P^* = \exp(0.0941 + \ln(59.95)) = $65.86
\]

So the price change is $65.86 - $59.95 = $5.91, which is greater than the cost of $5 to change the weight, so the answer is TRUE, you should recommend this change.

1b) FALSE. When average cost increases with increased scale of production (of the same product, here aircraft), the process exhibits diseconomies of scale. Diseconomies of scale refer to when average cost increases with the number of different products produced by the firm.
1c) TRUE. Because the presence of the ferries makes it difficult to raise the price on the train-road link without substantial loss of business, ferries must be included in an accurate definition of the market for transit on this route from Sweden to Denmark.

1d) FALSE. The percentage of a tax that is passed through to consumers is given as \( \frac{E_s}{E_s - E_d} \). Here, the elasticity of demand for the train-road link is very high, because of the presence of the ferries as a close substitute. If the overall demand for transport on this route is inelastic, this situation would arise from a high cross elasticity of ferry travel with regard to the train-road link price.

2) Your answer must contain a clear definition:

**Positive Network Externality**: The product is more valuable to each consumer if greater quantity is sold in the market.

Your answer must then take a position, namely true or false, and argue the position. Here is an example of a full credit answer:

TRUE: The greater is the quantity sold of Playstation II’s, the larger the market is for software/games for the Playstation II. Therefore, more software/games will be developed (as was the situation with Playstation I). Therefore, the greater is the market quantity, the more valuable (more available games, more options) is the Playstation II for each purchaser.

We have given partial credit to the answer

FALSE: People are just waiting for Playstation II because they perceive it to be a better product. Just because the advance marketing is extensive doesn’t mean there is a network externality. It just means that Sony understands the success of Playstation I and wishes to inform all of their happy customers of the new Sony product.

3)  

3a) Standard multi-plant monopoly picture (not included here; see recitation notes and/or lecture notes), MC2 lower than MC1; horizontal sum of MC’s gives overall MC of production, which is matched to MR.

Yes, production does occur in Southeast Asia; MC1 = MC2 assures that all units with MC1 less than the current MC2 in Latin America will be produced. There is a positive number of those units at each level of MC2.

3b) \( Q = 40,000 - 20,000P \) implies that

\[
P = \frac{(40,000/20,000)}{(1/20,000)} - \frac{1}{20,000} \times Q 
\]  
so that
R = PQ = (40,000/20,000) Q – (1/20,000) Q^2, or

MR = 2 – (1/10,000) Q

where Q is total Q = Q1+Q2.

Optimal production implies MC1 = MC2, or

(1/10,000)Q1 = (1/20,000) Q2,

so Q2 = 2 * Q1

Now, solve by setting MR = MC1, substituting Q2 = 2*Q1, as

2 – (1/10,000) (Q1 + 2Q1) = (1/10,000) Q1

which gives Q1 = 5,000 (Southeast Asia Production).

This gives Q2 = 10,000 (Latin American Production)

Therefore P = 1.25 (Price) and

Profits = R – C1 – C2 = 18750 – 1250 – 2500 = 15000.

4.

4a) Competition:

Demand is P = 200 – 2Q or Q = 100 – ½ P

Under competition, P = MC, so P = 40 cents.

For P = 40 cents/ride,

Q = 100 – ½*40, so Q = 80 thousand rides

Consumer surplus is ½ *80*(200 - 40) = ½*1.60*80 thousand = $64 thousand

Producer surplus is 0.

4b) Monopoly

TR = P*Q = (200 – 2Q)*Q = 200Q – 2Q^2

MR = 200 – 4Q

MR = MC ⇒ 200 – 4Q = 40 ⇒ 160 = 4Q ⇒ Q = 40 thousand rides
P = 200 –2Q = 200-2*40 = 120, or $1.20 per ride

Consumer surplus is now \( \frac{1}{2} \times 0.80 \times 40 \) thousand = $16 thousand

Producer surplus is 40 thousand * $0.80 = $32 thousand (Trailaway Profit)

Deadweight loss is \( \frac{1}{2} \times 0.80 \times 40 \) thousand = $16 thousand

4c) Subsidy, monopoly

Note that subsidy effectively changes MC to $0.20. MR remains the same.

\[ MR = MC \rightarrow 200 - 4Q = 20 \rightarrow 180 = 4Q \rightarrow Q = 45 \] thousand rides.

P = 200 –2Q = 200-2*45= 110, or $1.10 per ride

Producer surplus is 45 thousand * $0.90 = $40.5 thousand (Trailaway Profit)

Subsidy cost is 45 thousand * $0.20 = $9.0 thousand

Deadweight loss is \( \frac{1}{2} \times ($1.10 - $.40) \times 35 \) thousand = $12.25 thousand

 Aside: Providing the subsidy decreases dead-weight loss! Recall that, by selling less quantity than would be sold in a competitive market, a monopolist creates DWL. The subsidy gives the monopolist the incentive to offer more quantity than otherwise, thereby decreasing DWL. (More value is created by the additional trades than the cost of the program to the government.)