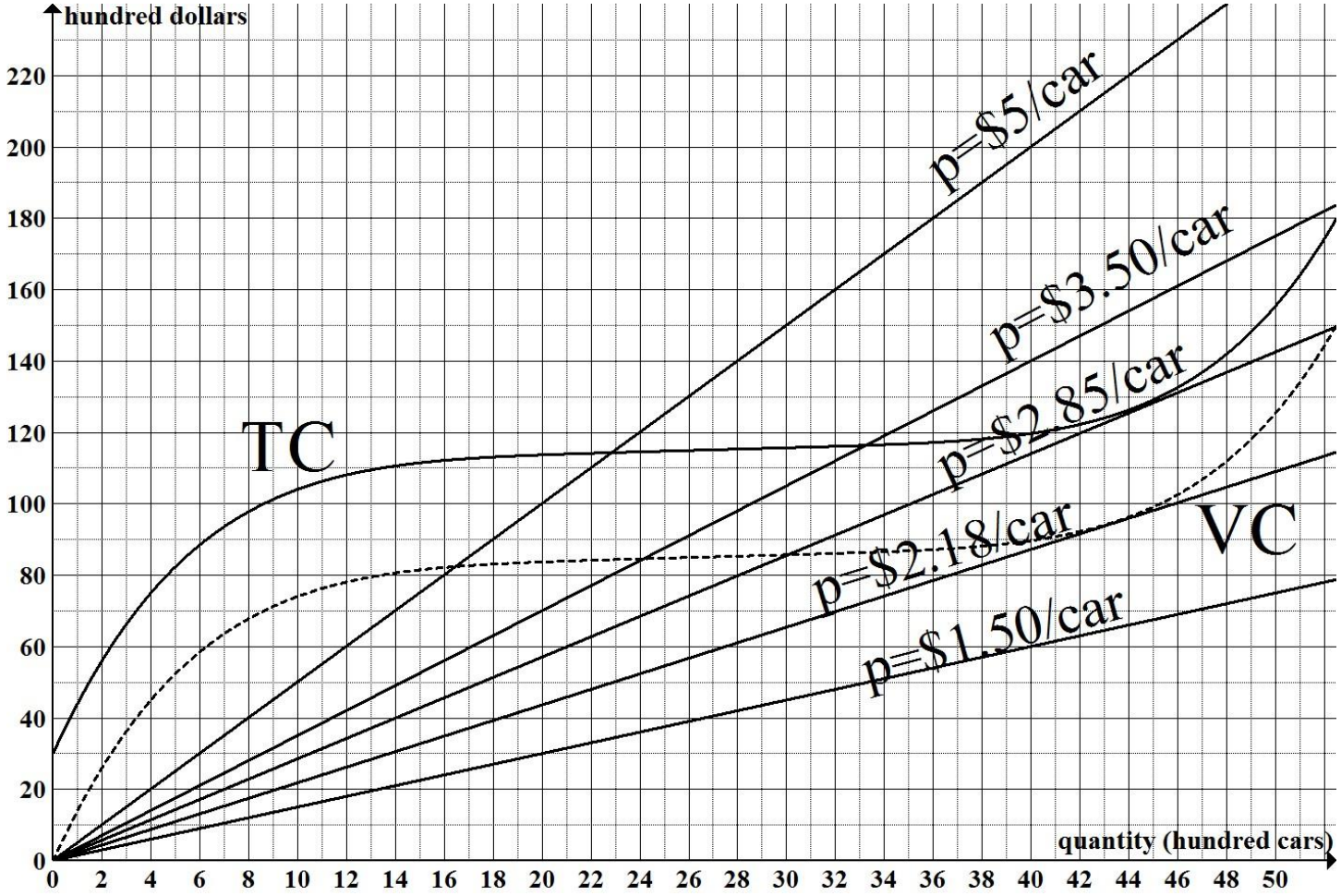
Business Graphs – TC/VC and AC/AVC Graphs Review/Quiz

The graph below gives Total Cost (TC) and Variable Cost (VC) in **hundreds** of dollars for producing *q* **hundred** toy cars. Also note that **several different total revenue (TR) lines have been drawn** corresponding to the indicated selling prices.



Quick quiz:

1. If the selling price is $5/car:
   (a) At what quantity do we start recovering some fixed costs? What is the average variable cost here?
   (b) At what quantity do we start making a positive profit? What is the average cost here?
2. If the selling price is $3.50/car:
   (a) At what quantity do we start recovering some fixed costs? What is the average variable cost here?
   (b) At what quantity do we start making a positive profit? What is the average cost here?
3. If the selling price is $2.85/car:
   (a) At what quantity do we start recovering some fixed costs? What is the average variable cost here?
   (b) It is <u>not possible</u> to have a positive profit. The best you can do is have a profit of zero at the quantity q = 45. What do we call this price? What is the average cost at q = 45?
4. If the selling price is $2.18/car: It is not possible to recover any fixed costs.
   The best you can do is have profit of -30 hundred dollars (the same as FC) at q = 43. What do we call this price? What is the average variable cost at q = 43?
5. If the selling price Is $1.50/car: You will lose more than fixed cost

Answers:

1. **Price = $5.00 / car**
   - **(a)** At **q ≈ 16.5 hundred cars**, we have TR = VC, so the profit will be -30 hundred dollars (matching FC).
     After 16.5 hundred cars, we start recovering some fixed costs (our loses will be less than 30 hundred dollars).
     Note that **AVC(16.5) = 5** dollars per car (*i.e.* at 16.5 the AVC equals the price of $5**)**.
   - **(b)** At **q ≈ 22.8 hundred cars**, we have TR = TC, so the profit will be 0.
     After 22.8 hundred cars, we start making a positive profit.
     Note that **AC(22.8) = 5** dollars per car (i.e. at 22.8 the AC equals the price of $5).

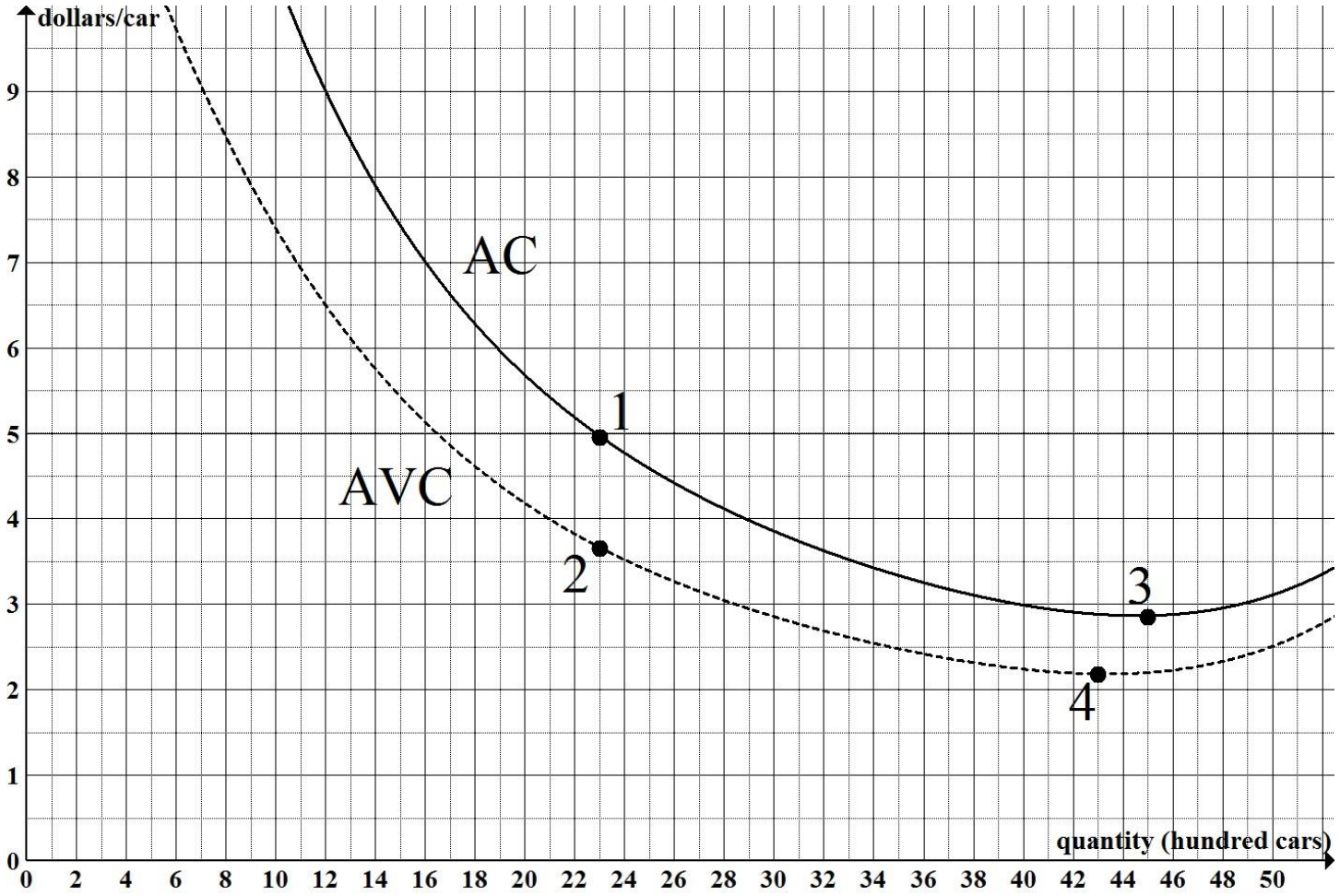
2. **Price = $3.50 / car**
   - **(a)** At **q ≈ 24 hundred cars**, we have TR = VC, so the profit will be -30 hundred dollars (matching FC).
     After 24 hundred cars, we start recovering some fixed costs.
     Note that **AVC(24) = 3.50** dollars per car (*i.e.* at 24 the AVC equals the price of $3.50**)**.
   - **(b)** At **q ≈ 33.2 hundred cars**, we have TR = TC, so the profit will be 0.
     After 33.2 hundred cars, we start making a positive profit.
     Note that **AC(33.2) = 3.50** dollars per car (i.e. at 33.2 the AC equals the price of $3.50).

3. **Price = $2.85 / car = BEP**
   - **(a)** At **q ≈ 30 hundred cars**, we have TR = VC, so the profit will be -30 hundred dollars (matching FC).
     After 30 hundred cars, we start recovering some fixed costs.
     Note that **AVC(30) = 2.85** dollars per car.
   - **(b)** At **q ≈ 45 hundred cars**, we have TR = TC, so the profit will be 0.
     The TR line never gets above TC, so it is not possible to have a positive profit.
     Thus, **$2.85 is what we can the breakeven price (BEP).**
     Note that **AC(45) = 2.85** dollars per car AND **this is the lowest value of AC you can get**!
     So we see, again, that **BEP is the same as the lowest value of AC**.

4. **Price = $2.18 / car = SDP**
   At **q ≈ 43 hundred cars**, we have TR = VC, so the profit will be -30 hundred dollars. We never can do better than this (we can't recover any fixed costs). **We call this the Shutdown price (SDP).**
   Note that **AVC(43) = 2.18** dollars per car AND **this is the lowest value of AVC you can get**!
   So we see, again, that **BDP is the same as the lowest value of AVC**.

5. **Price = $1.50 / car**
   No matter what, if you produce any items whatsoever, you will lose more than 30 hundred dollars. **You should Shutdown and produce zero items!**

The graph below gives Average Cost (AC) and Average Variable Cost (AVC) in dollars per car for producing *q* hundred toy cars. This graph matches the graphs of TC and VC from the previous page.



Quick quiz:

Read off each dot: what does each dot represent?

Find TC(23)

Find VC(23).

Find FC.

Answers on next page.

Remember these are the AC and AVC graphs that match the TC and VC graphs from the previous page. Hold them next to each other and practice seeing the connections.

Answers:

1. **AC(23) ≈ 4.90 dollars per car** = **TC(23)/23**
   Including all costs, it costs $4.90 per car on average to produce the first 23 hundred cars.
   Thus, TC(23) = 4.90 * 23 = 112.7 hundred dollars.

2. AVC(23) ≈ 3.60 dollars per car = VC(23)/23
Excluding fixed costs, it costs $3.60 per car in production costs to produce the first 23 hundred cars.
Thus, VC(23) = 3.60 * 23 = 82.8 hundred dollars.

3. AC(45) ≈ 2.85 dollars per car
This is the lowest value of AC which is the same as BEP as already noted.

4. AVC(43) ≈ 2.18 dollars per car
This is the lowest value of AVC which is the same as SDP as already noted.

As noted above:
TC(23) = 112.7
VC(23) = 82.8
So it must be the case that FC = 112.7 – 82.8 = 29.9 hundred dollars
Compare this with the first graph.

It actually doesn't matter that I used 23, you could have used any quantity and computed TC(q) and the corresponding VC(q) and gotten FC.