Digression: Relationship between average values and marginal values

Abbreviations:

Q = Quantity
AC = Average cost
TC = Total cost
MC = Marginal cost **= (TC)'**

AR = Average revenue
TR = Total revenue
MR = Marginal revenue **(= TR)'**

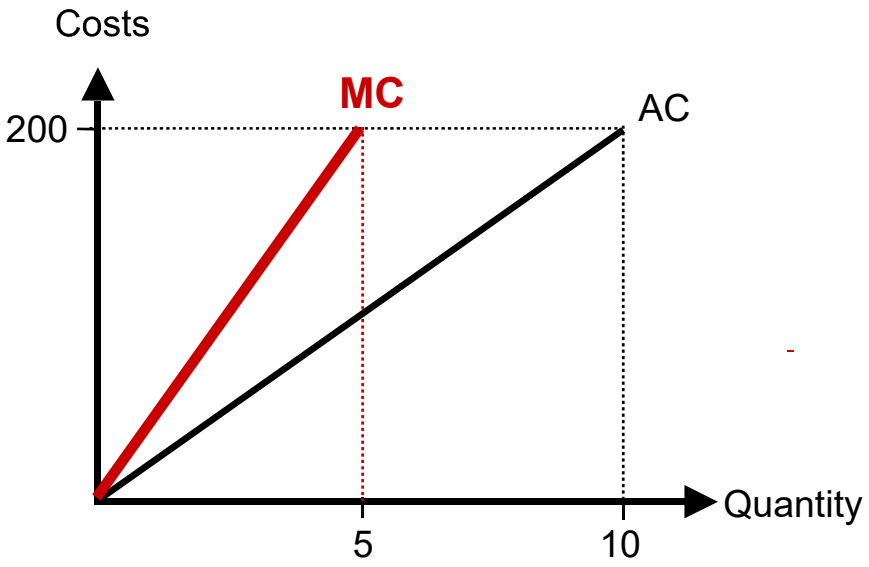
1 Average cost and marginal cost

- Statement: If marginal cost is **higher** than average cost, average cost increases.

- Steps to get from average cost to marginal cost:
  ① Total cost = Average cost * quantity
  ② (Total cost)'

- Example:

  AC = 20Q
  ① TC = 20Q*Q = $20Q^2$
  ② **MC = (TC)' = 40Q**



- The above statement is confirmed.

Question:

Does this statement (MC > AC → AC increases) also apply to **non-linear** average cost, e.g. AC = Q^2? What are the two steps?

① TC = AC*Q = Q^2*Q = Q^3
② (TC)' = MC = 3*Q^2

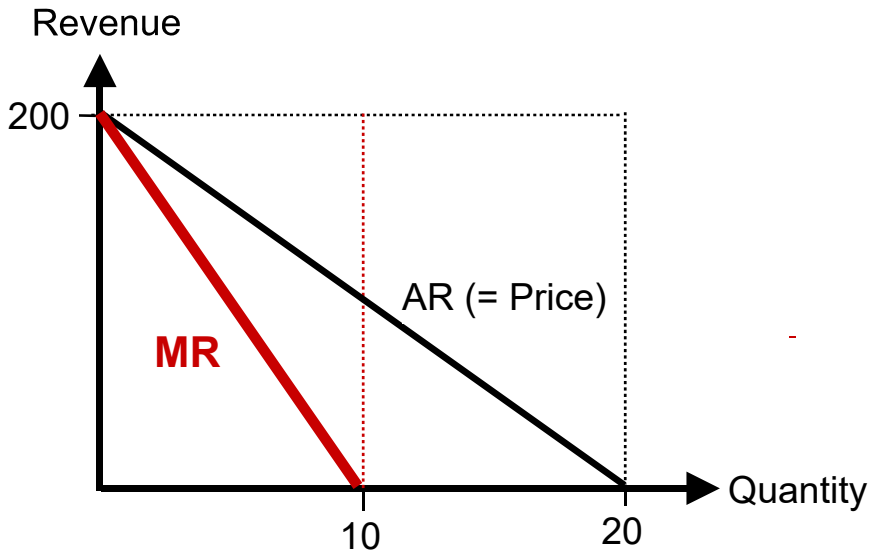
→ The MC-curve (**3***Q^2) is **above** the rising AC-curve (Q^2).
The statement is also confirmed in this case.

2 Average revenue and marginal revenue

- Statement: If marginal revenue is **lower** than average revenue, average revenue falls.

- Steps to get from average revenue to marginal revenue:
  ① Total revenue = Average revenue * quantity
  ② (Total revenue)'

- Example:
  AR = 200 - 10Q
  ① TR = 200Q - $10Q^2$
  ② **MR = (TR)' = 200 - 20Q**



- The above mentioned statement is confirmed.