4.5 Average Cost

Definition. The **average cost** is the total cost divided by the number of items, in other words

$$a(q) = \frac{C(q)}{q}$$

where q is the number of items, $C(q)$ is the total cost, and $a(q)$ is the average cost.

We can combine the conclusions of the previous example (including what can be seen in the graph) as follows:

If $a(q) = MC$ then $a(q)$ is at a critical point (*maybe* minimum)
If $a(q) < MC$ then increasing q will increase $a(q)$
If $a(q) > MC$ then increasing q will decrease $a(q)$

4.6 Elasticity of Demand

Definition. Let q be the quantity of some product demanded (bought) when the price is p (so q is a function of p).

- **elasticity** E defined as
$$E = \left| \frac{p}{q} \cdot \frac{dq}{dp} \right|$$
- E approximated by
$$E \approx \left| \frac{\Delta q/q}{\Delta p/p} \right|$$
- E interpreted as: percentage change in demand, compared to percentage change in price.
- predicting percentage change in demand:
$$\frac{\Delta q}{q} \approx -E \frac{\Delta p}{p}$$
- $E > 1$ means **elastic demand**
  $E < 1$ means **inelastic demand**

Note: Elasticity can change with time, or with price points. Also, some people use the negative of our definition of elasticity. When in doubt about signs, make sure that any calculation that predicts change in demand gives a change in the correct direction; i.e. increasing price should decrease demand and decreasing price should increase demand.

Rule. In general, the elasticity determines whether R is an increasing function of p or not:

If $E < 1$ then increasing p will increase R
If $E > 1$ then increasing p will decrease R
If $E = 1$ then R is at a critical point.