

Optimal allocation:  $MB = MC$

Suppose pizzas provide total benefits of  $B(Q)$  and cost a total of  $C(Q)$ , where  $Q$  is the quantity of pizzas. The optimal quantity of pizza production is achieved when the difference between the total benefits and the total costs of the pizzas is greatest. If we define the net benefits of pizza as  $NB(Q) = B(Q) - C(Q)$ , the optimal allocation is achieved at the output which maximizes  $NB(Q)$ .

To maximize, we differentiate and equate to zero:  $\frac{d}{dQ} NB(Q) = B'(Q) - C'(Q) = 0$

In words, maximum net benefit (allocative efficiency) is achieved when the marginal benefit minus the marginal cost of pizza is zero, or alternatively, when the marginal benefit of pizza equals its marginal cost. (Of course, we should verify that the second-order conditions are met as well. The condition  $B''(Q) - C''(Q) < 0$  is sufficient to ensure maximum rather than minimum net benefits.)