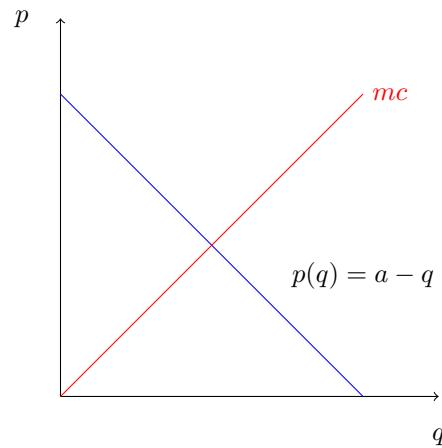


## Monopoly graphs

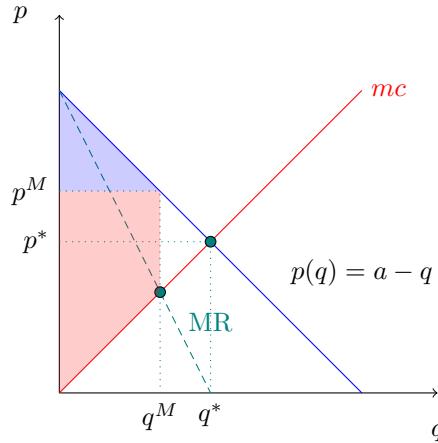
For the following graph. Mark:

1. The marginal revenue curve
2. The monopoly equilibrium point
3. The equilibrium point under perfect competition
4. The consumer and producer surplus in monopoly.
5. Assume that the inverse demand is now  $p(q) = 2a - 2q$ , graph it. What happens to the producer surplus?



## Solution

To find marginal revenue, we derive the demand, calculate the income  $I = pq = q(a - x) = ax - x^2$ , differentiate:  $MR = a - 2x$ . Therefore, the marginal revenue is the demand curve with twice the slope. For the monopoly equilibrium, we equalize marginal cost to marginal revenue. We find the optimal monopoly quantity and with that quantity, we find the monopoly price with the demand curve. For the equilibrium point of perfect competition, it is the point where demand and supply intersect (which is the marginal cost curve). For the consumer and producer surplus in monopoly, we calculate the area under the demand curve and above the price and above the supply curve and below the price. In red, the producer surplus is graphed, and in blue, the consumer surplus.



Now we recalculate marginal revenue, calculate income:  $I = x(2a - 2x) = 2ax - 2x^2$ , and finally marginal revenue:  $MR = 2a - x$ . We graph again, the producer surplus increases both in monopoly and in perfect competition.

