Le monopole est malthusien

$$\Pi(q) = R(q) - C(q)$$

Le bénéfice est maximum quand $R'(\hat{q}) = C'(\hat{q})$

$$R'(q) = [P(q) \times q]'_q = [(10–0,1\,q) \times q]'_q = [10\,q - 0,1\,q^2]'_q$$

$$= 10 - 0,2\,q$$

$$C'(q) = [0,1(q–30)^2 + 100]'_q = 0,2(q–30)$$

$$10 - 0,2\,\hat{q} = 0,2(\hat{q}–30)$$

$$\hat{q} = \frac{10 + 0,2 \times 30}{0,2 + 0,2} = \frac{16}{0,4} = 40$$

Maximiser le surplus global

$$
\begin{aligned}
Sg(q) &= Sc(q) + \Pi(q) \\
&= \frac{[10 - P(q)] \times q}{2} + P(q) \times q - C(q) \\
&= \frac{[10 - P(q)] \times q}{2} + (10 - 0{,}1\, q) \times q - [0{,}1\,(q - 30)^2 + 100] \\
&= 10\, q - 0{,}1 \frac{1}{2} q^2 - 0{,}1(q - 30)^2 + \text{constante} \\
Sg'(q) &= 10 - 0{,}1\, q - 0{,}2\,(q - 30)
\end{aligned}
$$

$$
Sg'(q^\star) = 0 \quad \Longleftrightarrow \quad q^\star = \frac{10 + 0{,}2 \times 30}{0{,}1 + 0{,}2} \approx 53{,}3
$$