

(a)

$$q = \frac{100}{p^2}$$

So $p = \sqrt{\frac{100}{q}} = \frac{10}{\sqrt{q}}$, which is the inverse demand curve.

$$\text{Profit} = pq - c(q)$$

$$= \frac{10}{\sqrt{q}} \cdot q - q$$

$$= 10q^{\frac{1}{2}} - q$$

Let $\frac{\partial \text{Profit}}{\partial q} = 0$, we have

$$5q^{-\frac{1}{2}} - 1 = 0 \quad q^{\frac{1}{2}} = 5 \quad q = 25$$

$$\text{profit} = 10 \times 5 - 25 = 25.$$

(b) If the market was competitive,

$$p = 0. \quad \text{Thus} \quad p = \frac{100}{p^2} \quad p = (100)^{\frac{1}{3}}$$