

(1) [7] Determine the marginal cost when $q = 50$ units if average cost is given by

$$\bar{c} = 0.01q + 5 + \frac{500}{q} \text{ \$/unit}$$

State units with your answer.

$$\begin{aligned} C &= \bar{c}q \\ &= 0.01q^2 + 5q + 500 \end{aligned}$$

$$\frac{dC}{dq} = 0.02q + 5$$

$$\left. \frac{dC}{dq} \right|_{q=50} = 0.02(50) + 5 = \boxed{6 \text{ \$/unit}}$$

(2) [8] Determine marginal revenue if the demand equation relating price p (in dollars) to quantity q (in units produced) is

$$p = \frac{108}{q+2} - 3$$

State units with your answer.

$$r = pq$$

$$= \left(\frac{108}{q+2} - 3 \right) q$$

$$= 108 \frac{q}{q+2} - 3q$$

$$\frac{dr}{dq} = 108 \left[\frac{(q+2)(1) - (q)(1+0)}{(q+2)^2} \right] - 3$$

$$= \boxed{\frac{216}{(q+2)^2} - 3}$$