ECO137 Quiz Answer.

Q1 $f(x) = x^3 - 3x + 8 \quad [-1, 2]$

Find the maximum & minimum

$f'(x) = 3x^2 - 3 = 0$

$x^2 = 1 \quad x = \pm 1$

$f(-1) = -1 + 3 + 8 = 10$ max ①

$f(1) = 1 - 3 + 8 = 6$ min ①

$f(2) = 8 - 6 + 8 = 10$ max ①

Q2 $P(Q) = 18 - 0.006\,Q$

$C(Q) = 0.004\,Q^2 + 4Q + 4500$

Find the profit maximizing level of output Q^* and the maximized profit π^*

$\pi(Q) = 18Q - 0.006Q^2 - 0.004Q^2 - 4Q - 4500$

$= -0.01Q^2 + 14Q - 4500$

$\pi'(Q) = -0.02Q + 14 = 0$

$Q^* = \frac{14}{0.02} = \boxed{700}$ ②

$\pi(Q^*) = -0.01(700)^2 + 14(700) - 4500 = \boxed{4900}$ ②

Q3 Find the inflection point for

$f(x) = x^3 + \frac{3}{2}x^2 - 6x + 10$

$f'(x) = 3x^2 + 3x - 6$

$f''(x) = 6x + 3 = 0 \quad \boxed{x = -\frac{1}{2}}$ ②

$f''(x=-1) = -6 + 3 = -3 < 0$

$f''(x=0) = 3 > 0$