HW Questions for chapter 9

1. Find stationary values of followings & check whether relative (local) maxima or minima or inflection points), assuming the domain to be the set of all real numbers.

   (a) $y = -2x^2 + 4x + 9$

   (b) $y = x^2 + 3$

   (c) $y = 3x^2 - 6x + 2$

2. Find the second & third derivatives of the following functions

   (a) $\frac{2x}{1-x}$ $(x \neq 1)$

   (b) $\frac{1+x}{1-x}$ $(x \neq 1)$

3. Which of the following quadratic functions are strictly convex?

   (a) $y = 9x^2 - 4x + 2$

   (b) $u = 9 - x^2$

   (c) $v = 8 - 3x + x^2$

4. Find the relative maxima & minima of y by the second derivative test (local)

   (a) $y = \frac{1}{3}x^3 - 3x^2 + 5x + 3$

   (b) $y = \frac{2x}{1-2x}$ $(x \neq \frac{1}{2})$

5. Given $TC = \frac{1}{3}Q^3 - 7Q^2 + 111Q + 50$ (total cost function)

   $Q = 100 - P$ (demand function)

   Find the profit maximizing level of output Q^*

6. Find the stationary values of (a) $y = (x-1)^3 + 16$, (b) $y = x^6 + 5$ & determine if they are local maxima, minima or inflection point