

1. Finding Extreme Values of the function and where they occur

(1).  $y = 2x^2 + 8x + 9$

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

(3).  $y = \frac{x}{x^2+1}$

(4)  $y = \begin{cases} -x^2 - 2x + 4 & x \leq 1 \\ -x^2 + 6x - 4 & x > 1 \end{cases}$

2. If an even function  $f(x)$  has a local maximum value at  $x = c$ , can anything be said about the value of  $f$  at  $x = -c$ ?

3. Find the intervals on which the function is increasing or decreasing.

(1).  $f(x) = -x^3 + 2x$

(2)  $f(x) = (x+7)^3$

(3)  $f(x) = \frac{x^2-3}{x-2}, x \neq 2$

(4)  $f(x) = -2\cos x - \cos^2 x$

4. Show the inequation:

$$x - \frac{x^3}{6} < \sin x < x, \quad x > 0$$

5. Let  $f(x) = x^2 - x \sin x$

Show the solution set of inequation

$$f(2x-1) < f(x+1)$$