

Mathematical Analysis (470-2110/06)

Exercises – Part 7

The problems given below are to practise for the semester tests or the final exam.

Examination of Function Behaviour

1. Determine the maximal intervals of strict monotonicity a function f .

(a) $f(x) = \frac{x^3}{e^x}$;

(b) $f(x) = -\frac{x^2}{2} + \arctan(x^2)$.

2. Determine all the local extremes of a function f .

(a) $f(x) = \sqrt{x} \ln x$;

(b) $f(x) = |x|(x-1)^2$;

(c) $f(x) = (x+1)^3 - 12x + 6$.

3. Determine all the inflection points of a function $f(x) = 5x^7 + 7x^6 - 470x + 1$.

4. Find all the vertical asymptotes of a function $f(x) = \frac{x^3 - 6x^2 + 11x - 6}{x^2 - x - 6}$.

5. Find the asymptote at $-\infty$ of a function $f(x) = \frac{4x^2 - 11x + 10}{x - 1}$.

6. Find all the global extremes of a function f .

(a) $f(x) = x^3 + 3x^2 - 9x + 7$, $M = [-4, 4]$;

(b) $f(x) = 3x + \sqrt[3]{1-x}$, $M = [0, 1]$.