

Assignment 4

Supplementary Problems

Hand in: Supplementary Exercises no. 2, 3.

Deadline: Feb 9, 2018.

- Determine which of the following functions are convex/strictly convex:
 - $f_1(x) = x^p, x \in (0, \infty)$.
 - $f_2(x) = x^x, x \in (0, \infty)$.
 - $f_3(x) = \tan x, x \in (-\pi/2, \pi/2)$.
 - $f_4(x) = x \log x, x \in (0, \infty)$.
 - $f_5(x) = (1 + \sqrt{x})^{-1}, x \in (-1, \infty)$.
- Let f and g be two convex functions defined on I . Show that the function $h(x) = \max\{f(x), g(x)\}$ is convex. Is the function $j(x) = \min\{f(x), g(x)\}$ convex?
- Give an example to show that the product of two strictly convex functions may not be convex. How about the composite of two strictly convex functions?
- Let f be a convex function on (a, b) whose inverse exists. Is the inverse function convex?