# Calculus 1 - Homework 4

**1. (9 points)** Let $f(x) = (x - 2)^3 (x + 3)^2$

a) Determine the intervals where the function increases or decreases.

b) Find the local extreme values of the function.

c) Find the global extreme values of $f$ on the interval $[-4, 1]$.

**2. (8 points)** Find the inflection points of the function $f(x) = \left(x^2 - 2\right) e^{-x}$.

a) Determine the intervals where the function is convex or concave.

b) Find the inflection points of the function.

**3. (8 points)** You want to make a cylindrical tin cup with closed top of volume 1 liter.
What is the minimal possible surface area of the cup?

**4.* (8 points)** The widths of two perpendicular corridors are 2.4 m and 1.6 m, respectively.
What is the longest ladder that can be moved (in a horizontal position) from one corridor to another?

Deadline: December 12th.