

### Homework 3

Assume that  $a_1, a_2, \dots, a_n$  are real numbers which are all the same sign (all positive or all negative), and assume that all of them are strictly greater than  $-1$ .

1. Show that

$$\prod_{i=1}^n (1 + a_i) \geq 1 + \sum_{i=1}^n a_i.$$

Hint: induct on  $n$ .

2. Use the result of the previous problem to show that if  $x > -1$ ,

$$(1 + x)^n \geq 1 + nx$$

Hint: take  $a_1 = a_2 = \dots = a_n = x$ .