Homework 1

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Problem 1:

Derive the relative and absolute condition number of a function at the point x. Based on our notation from the class, note that the change of data δd is equivalent to the change in the fucntion value, i.e $f(x)$. In particular, let's assume we perturb x by $h > 0$, where $\delta d = f(x + h) - f(x)$.

(a) To show that $(\mathbb{R}\backslash\{-1\}, *)$ is an Abelian group, we must prove it satisfies five properties:

(b) $3 * x * x = 15$
$3 * (x * x) = 3 * (x^2 + 2x) = 3(x^2 + 2x) + 3 + x^2 + 2x$
$3x^2 + 6x + 3 + x^2 + 2x = 4x^2 + 8x + 3$
$4x^2 + 8x + 3 = 15 \rightarrow x^2 + 2x - 3 =$
$(x + 3)(x - 1) = 0$
$x = 1, -3$