Tile III lsh 2 014338876 Aird Järvenpää

(1) Let's consider vector $\bar{x} = [x_1, x_2, \dots x_n]$ with single biggest element x_j. It is clear that if $x_j > x_i$ for every $i \neq j$ and $i \leq n$ then $\lim_{p\to\infty} x_j^p \gg \lim_{p\to\infty} x_i^p$ and therefore $\lim_{p\to\infty} \sum_{i=1}^{n} x_i^p \approx \lim_{p\to\infty} x_j^p$ and $\lim_{p\to\infty} (\sum |x_i^p|)^{1/p} \approx \lim_{p\to\infty} (|x_j^p|)^{1/p} = |x_j| = \max(|x_i|)$.

If there happened to be $m \leq n$ elements with value x_j so that $x_j \geq x_i$ for every $i \leq n$. In that case $\lim_{p\to\infty} \sum_{i=1}^{n} x_i^p \approx m \cdot \lim_{p\to\infty} x_j^p$. Now taking the root yields $\lim_{p\to\infty} (\sum |x_i^p|)^{1/p} \approx \lim_{p\to\infty} (m x_j^p)^{1/p}$ where for large p $m^{1/p} \approx 1$ and therefore $\lim_{p\to\infty} (\sum |x_i^p|)^{1/p} \approx \lim_{p\to\infty} (|x_j^p|)^{1/p} = |x_j| = \max(|x_i|)$

(2) (a) When setting N = INT_MAX the value returned by harmonic_kahan is 22,0647793 which is more than either of week 1 functions returned. This is due to the algorithm reducing the effect of numerical error when adding floats.