Exponentially Large Solution – Graydon Strachan

Determine values of $w^x + y^z$, from the set {-1, -2, -3, -4, -5} such that the largest sum is made.

The total number of permutations that can be made from 5 distinct integers in ${}^4_5\mathrm{C} \cdot 4! = 120$.

Because the total number of permutations is so low, it is computationally inexpensive to check every value of w, x, y and z to find the maximum sum.

To do this a modified form of a general recursive permutation algorithm can be used such that it generates sets with four items. This looks like the following.

```
set S = {-1, -2, -3, -4, -5}
sum = 0
set N = {};
make_set(N);

make_set(set N)
    if N's size = 4
        calculate w^x + y^z for elements of set N
        if w^x + y^z > sum, sum = w^x + y^z
    else
        for every element a in S
            append a to N
            make_set(set N)
            remove last element of N
```

Using this algorithm, it can be determined that the permutation that yields the greatest sum would be a set *N*, where *N* = {-1, -4, -3, -2}. This set *N* gives a sum of $1.\overline{11}$ or $10/9$.