Numeric sketch of proof

In this experiment I generate 50000 pseudorandom numbers with a power-law distribution defined as

```
PDF[ZipfDistribution[0.95], l]
```

$$\begin{cases} \frac{0.590169}{l^{1.95}} & l \geq 1 \\ 0 & \text{True} \end{cases}$$

A sorted number sequence with this distribution, defined as *l,* is analogous to the wrongly calculated *record breaking waiting time* that it was actually a plain *record breaking time*.

An exampe of 50 sorted pseudorandom numbers generated with a power-law distribution.

```
Sort[RandomVariate[ZipfDistribution[0.95], 50]]
```

```
{1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2, 3, 3, 4, 5, 5, 6, 9, 14, 20, 25, 26}
```

It is possible to obtain the *record breaking waiting time* sequence *k* from the *record breaking time* sequence *l* by taking the differences between *record breaking times*.

```
Diff[seq_, lag_:1] := Drop[seq, lag] - Drop[seq, -lag];
```

```
Diff[Sort[RandomVariate[ZipfDistribution[0.95], 50]]]
```

```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0, 0, 0, 0, 3, 2, 18, 15}
```

For the k distribution, 10000 sequences of 200 transformed points were generated. The results are shown below.

```
data1 = RandomVariate[ZipfDistribution[0.95], 50 000];
data2 = Flatten[Table[Diff[Sort[RandomVariate[ZipfDistribution[0.95], 200]]], 10 000]];

HistogramPointPlot[
 {data1, data2},
 ScalingFunctions → {"Log", "Log"},
 PlotLegends → Placed[
   LineLegend[
    {"Power-law distributed pseudorandom numbers l", "Distribution of k"},
    LegendFunction → (Framed[#, Background → Opacity[0.6, White]] &),
    LabelStyle → 11
   ],
   {Right, Top}
  ]
]
```