# Modified K-S Algorithm

## Algorithm

1. Let $x_i \in B$, where $B = \{30.1, 17.6, 12.5, 9.7, 7.9, 6.7, 5.8, 5.1, 4.6\}$ is the expected proportion or Benford's proportion.
2. Let $y_i \in O$, where $O$ is the observed proportion say
$$O = \{y_1, \ldots, y_i, \ldots, y_9\}.$$
3. Let $T = \{(x_1, y_1), (x_2, y_2), \ldots, (x_9, y_9)\}$. Find the set of all 9! permutations $P$.
4. Calculate
$$D_{p_k} = \max_{1 \le i \le j} |\sum_{i=1}^{j} (x_i^{(k)} - y_i^{(k)})|, \quad j = 1, 2, \ldots, 9$$
for the $k$-th permutation $p_k$ in $P$.
5. Calculate $\min\{D_{p_k} : p_k \in P \; and \; k = 1, 2, \ldots, 9!\}$.