

Program: Search Comparison Table

Your task in this programming assignment is to write a Python program that generates the sequential search/binary search comparison table in the lesson on *Searching and Sorting*. Here's the table for reference:

Number of items	Sequential search	Binary search	Performance
0	0	0	0
1,000	500	10	50
2,000	1,000	11	91
3,000	1,500	12	125
4,000	2,000	12	167
5,000	2,500	13	192
6,000	3,000	13	231
7,000	3,500	13	269
8,000	4,000	13	308
9,000	4,500	14	321
10,000	5,000	14	357

The first column will be specified (via user input) and the remaining columns will be calculated. Specifically, the user will specify a minimum and maximum list size (number of items in the table) and an interval (how much to increase the list size for the next row in the table). Here's output of a sample run (user input is shown in bold red):

```

Minimum number of list items (>=0)? 0
Maximum number of list items (>= min (0))? 10000
The interval between each row of the table (>= 1)? 1000
n          Seq      Bin      Perf
-----
0           0        0        0
1000        500      10       50
2000       1000     11       91
3000       1500     12      125
4000       2000     12      167
5000       2500     13      192
6000       3000     13      231
7000       3500     13      269
8000       4000     13      308
9000       4500     14      321
10000      5000     14      357

```

Here's another sample run to further show how the user input dictates the overall structure of the table (again, user input is shown in bold red):

```

Minimum number of list items (>=0)? 455
Maximum number of list items (>= min (455))? 999
The interval between each row of the table (>= 1)? 25
n          Seq      Bin      Perf
-----
455        227       9        25
480        240       9        27
505        252       9        28
530        265      10        27
555        277      10        28
580        290      10        29
605        302      10        30
630        315      10        32
655        327      10        33
680        340      10        34
705        352      10        35
730        365      10        37
755        377      10        38
780        390      10        39
805        402      10        40
830        415      10        42
855        427      10        43
880        440      10        44
905        452      10        45
930        465      10        47
955        477      10        48
980        490      10        49

```

Also, your program should properly deal with invalid user input; for example:

```

Minimum number of list items (>=0)? -1
*ERROR: Minimum must be >= 0!
Minimum number of list items (>=0)? 100
Maximum number of list items (>= min (100))? 25
*ERROR: Maximum must be >= minimum (100)!
Maximum number of list items (>= min (100))? 1000
The interval between each row of the table (>= 1)? 0
*ERROR: Interval must be >= 1!
The interval between each row of the table (>= 1)? 250
n          Seq      Bin      Perf
-----
100        50       7         7
350       175       9        19
600       300      10        30
850       425      10        43

```

To help clarify, here are some specifics and/or constraints:

- (1) Displaying the entire table must be done in its own function;
- (2) Calculating the average number of comparisons of a sequential search must be done in its own function (see the template for more details);
- (3) Calculating the maximum number of comparisons of a binary search must be done in its own function (see the template for more details);
- (4) Obtaining user input can be done in the main part of the program (or in a separate function);
- (5) Range (or boundary) checking of user input must be done;
- (6) You must use the provided source code template; and
- (7) You must submit your source code as a single .py file.