Input & Output Script:

As MATLAB R2020b outputs values to 4 decimal places, the use of 'format long' allows the output values to display all digits.

Following the step algorithm, setting epsion to equal 1 so that the smallest value can be determined, as this new determined value will be added to 1 giving a overall value greater to 1.

```
epsilon =

     1
```

Beginning the loop section by stated if epsilon is greater than 1 then it must run the 'while' command. While epsilon continues to be greater than 1 then it must divide epsilon by 2 and this will repeat until the value of epsilon is less than 1. After each loop the previous calculated values of epsilon will be used to form the new value.

```
epsilon =

   0.500000000000000


epsilon =

   0.250000000000000


epsilon =

   0.125000000000000


epsilon =

   0.062500000000000


epsilon =

   0.031250000000000


epsilon =

   0.015625000000000


epsilon =

   0.007812500000000
```

```
epsilon =

   0.003906250000000

epsilon =

   0.001953125000000

epsilon =

     9.765625000000000e-04

epsilon =

     4.882812500000000e-04

epsilon =

     2.441406250000000e-04

epsilon =

     1.220703125000000e-04

epsilon =

     6.103515625000000e-05

epsilon =

     3.051757812500000e-05

epsilon =

     1.525878906250000e-05

epsilon =

     7.629394531250000e-06

epsilon =
```

```
     3.814697265625000e-06

epsilon =

     1.907348632812500e-06

epsilon =

     9.536743164062500e-07

epsilon =

     4.768371582031250e-07

epsilon =

     2.384185791015625e-07

epsilon =

     1.192092895507812e-07

epsilon =

     5.960464477539062e-08

epsilon =

     2.980232238769531e-08

epsilon =

     1.490116119384766e-08

epsilon =

     7.450580596923828e-09

epsilon =

     3.725290298461914e-09

epsilon =
```

```
     1.862645149230957e-09

epsilon =

     9.313225746154785e-10

epsilon =

     4.656612873077393e-10

epsilon =

     2.328306436538696e-10

epsilon =

     1.164153218269348e-10

epsilon =

     5.820766091346741e-11

epsilon =

     2.910383045673370e-11

epsilon =

     1.455191522836685e-11

epsilon =

     7.275957614183426e-12

epsilon =

     3.637978807091713e-12

epsilon =

     1.818989403545856e-12
```

```
epsilon =

     9.094947017729282e-13

epsilon =

     4.547473508864641e-13

epsilon =

     2.273736754432321e-13

epsilon =

     1.136868377216160e-13

epsilon =

     5.684341886080801e-14

epsilon =

     2.842170943040401e-14

epsilon =

     1.421085471520200e-14

epsilon =

     7.105427357601002e-15

epsilon =

     3.552713678800501e-15

epsilon =

     1.776356839400250e-15

epsilon =

     8.881784197001252e-16
```

```
epsilon =

     4.440892098500626e-16


epsilon =

     2.220446049250313e-16


epsilon =

     1.110223024625157e-16
```

When epsilon is less than 1, a new value for epsilon will be formed by multiplying epsilon by 2. After this the script will stop and the final value of epsilon will be calculated.

```
epsilon =

     2.220446049250313e-16
```

MatLab contains a in-built 'eps' function that will produce a value for epsilon, this value will be compared with the value calcualted by the above script, the loop calculated values should equal to the validation value from the 'eps' function.

```
Validation =

     2.220446049250313e-16
```

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