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Group 4
Assignment 5 – ENSC 180

1)

```
>> A5_Q1
Enter a 3x3 matrix: [4 3 1;3 7 -1; 1 -1 9]
The eigenvalues for this matrix are:
    9.4399

    8.6808

    1.8793

The eigenvectors are obtained by solving the following matrices and equating
them to a 3x1 zero matrix

A_eig1 =

   -5.4399    3.0000    1.0000
    3.0000   -2.4399   -1.0000
    1.0000   -1.0000   -0.4399


A_eig2 =

   -4.6808    3.0000    1.0000
    3.0000   -1.6808   -1.0000
    1.0000   -1.0000    0.3192


A_eig3 =

    2.1207    3.0000    1.0000
    3.0000    5.1207   -1.0000
    1.0000   -1.0000    7.1207
eig(A)

ans =

    1.8793
    8.6808
    9.4399
```

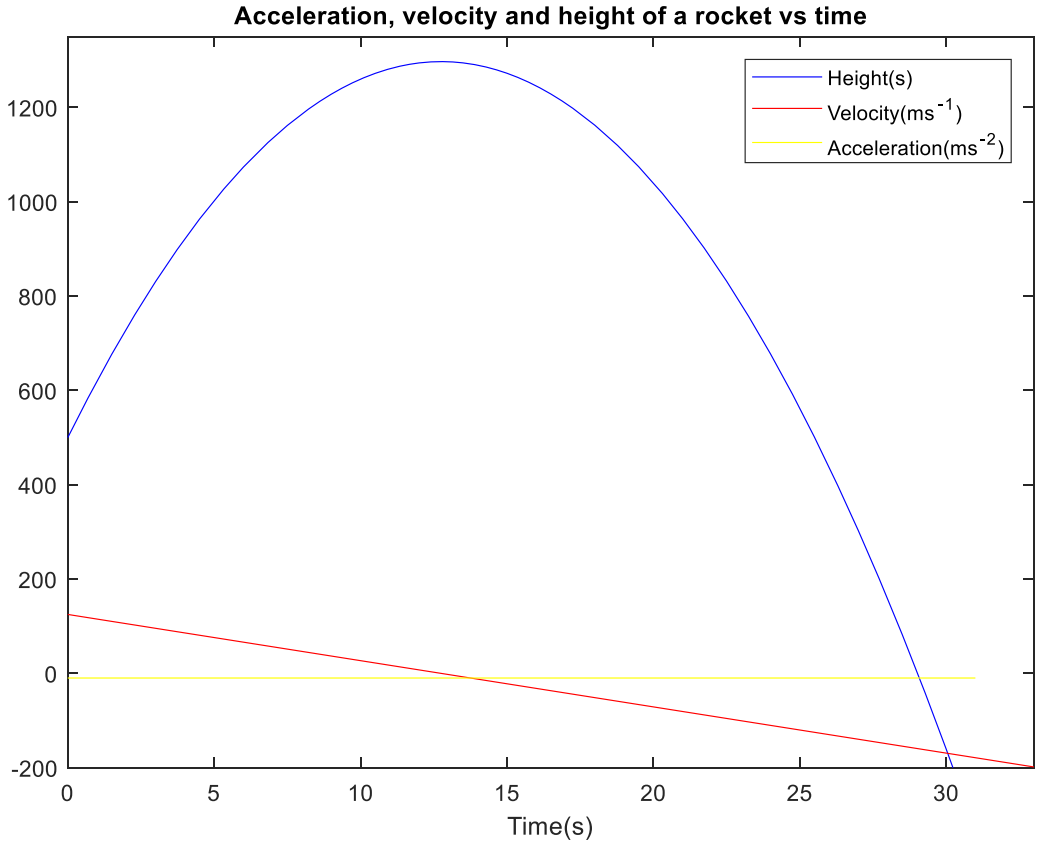
These are the same eigenvalues obtained from the code.

2) >> A5_Q2

```
V =

   -0.6240    0.2117   -0.7522
    0.4820   -0.2286   -0.4642
    0.2206    0.5325   -0.0332


D =

    1.3292         0         0
         0    3.2756         0
         0         0    5.8952

a 6x6 magic matrix:

M =

    35     1     6    26    19    24
     3    32     7    21    23    25
    31     9     2    22    27    20
     8    28    33    17    10    15
    30     5    34    12    14    16
     4    36    29    13    18    11

The sum of columns of M
 111  111  111  111  111  111
The sum of rows of M
 111
 111
 111
 111
 111
 111
The trace of M
 111
The sum of the opposite diagonal of M
 111
Replacing A with a 4x4 magic matrix

Initializing B

B =

    16     2     3    13    32     4     6    26
     5    11    10     8    10    22    20    16
     9     7     6    12    18    14    12    24
```

```
     4    14    15     1     8    28    30     2
   256     4     9   169    18     4     5    15
    25   121   100    64     7    13    12    10
    81    49    36   144    11     9     8    14
    16   196   225     1     6    16    17     3

The sum of columns of B
 412  404  404  412  110  110  110  110
The sum of rows of M
 102
 102
 102
 102
 480
 352
 352
 480
The trace of M
 76
The sum of the opposite diagonal of M
 402
>>
```

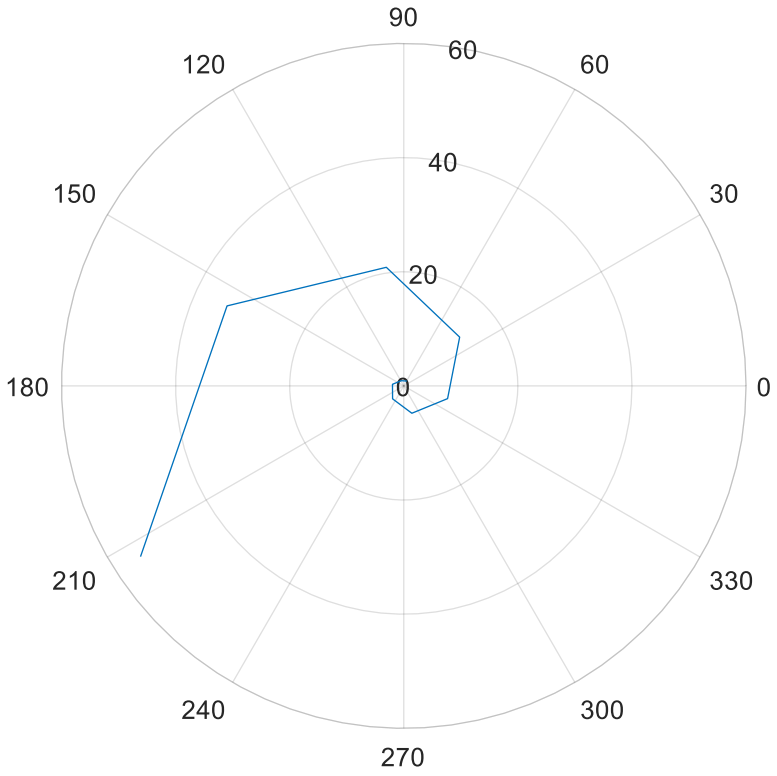
3)



4)

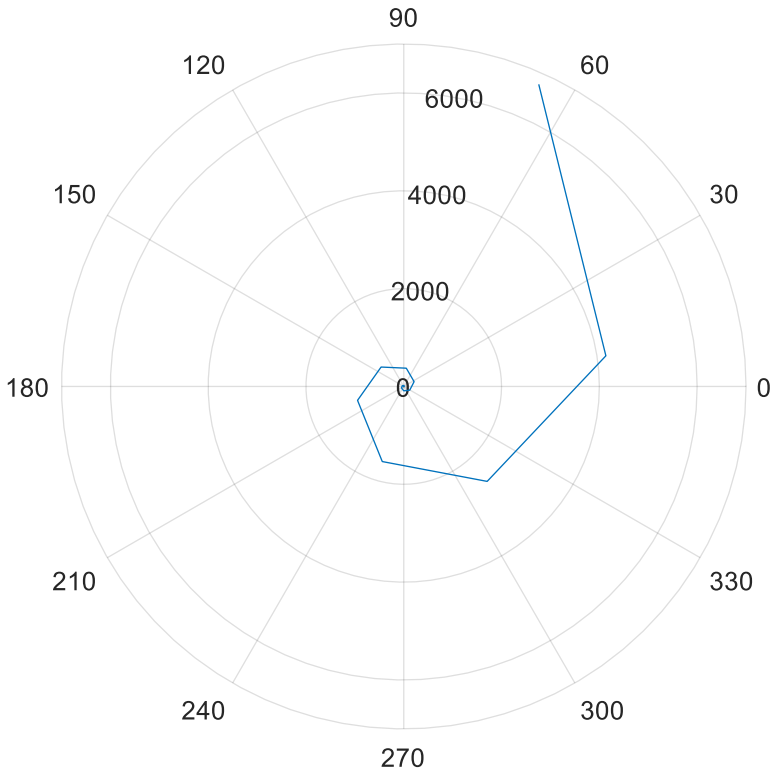
As the sequence grows, the ratio converges to the golden ratio: 1.61803398875

```
>> A5_Q4
Input the first number: 1
Input the second number: 1
Input the total number of elements: 10

ratio =

    2.0000
    1.5000
    1.6667
    1.6000
    1.6250
    1.6154
    1.6190
    1.6176

>>
```




```
>> A5_Q4
Input the first number: 1
Input the second number: 1
Input the total number of elements: 20

ratio =

    2.0000
    1.5000
    1.6667
    1.6000
    1.6250
```

```
    1.6154
    1.6190
    1.6176
    1.6182
    1.6180
    1.6181
    1.6180
    1.6180
    1.6180
    1.6180
    1.6180
    1.6180

>>
```




```
>> A5_Q4
Input the first number: 1
Input the second number: 1
Input the total number of elements: 40

ratio =

    2.0000
    1.5000
    1.6667
    1.6000
    1.6250
    1.6154
    1.6190
```

1.6176
1.6182
1.6180
1.6181
1.6180
1.6180
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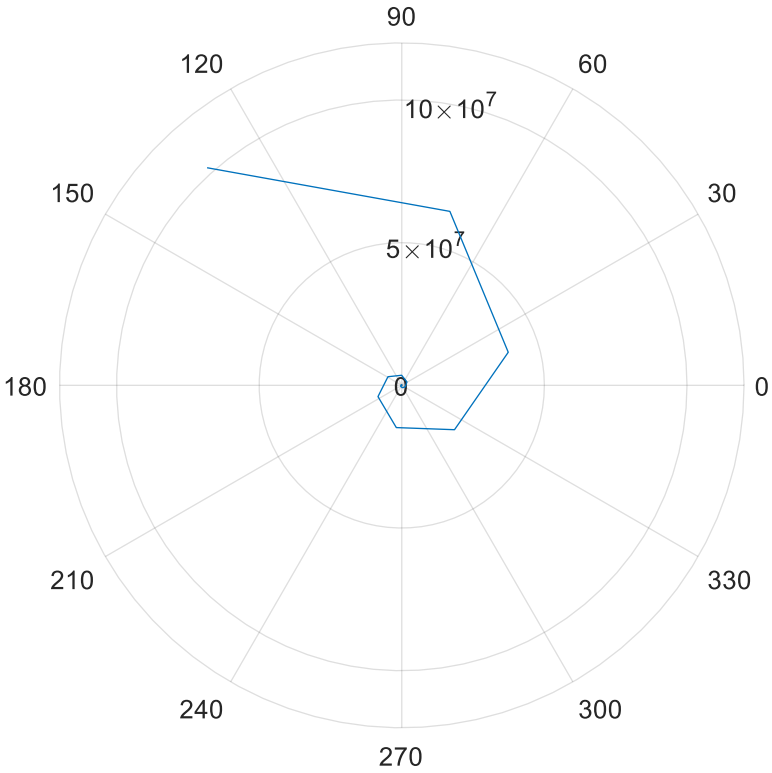
1.6180


90
120
60
10×10^7
150
30
5×10^7
180
0
0
210
330
240
300
270

>>