Homework #1

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1

Use Range, Reverse and Join to create {1, 2, 3, 4, 4, 3, 2, 1}
Output: {1, 2, 3, 4, 4, 3, 2, 1}

2

$M = a_{ij}$, to calculate determinant, eigenvalues and eigenvectors for M, where a_{ij} is the random real numbers in the range (1, 5)

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Out[2]= {{2.30933, 4.62382, 1.95961, 2.17619, 3.68217},
         {3.63475, 4.64852, 1.38155, 0.500066, 1.78809}, {3.47397, 0.53693, 0.668689, 3.25977, 4.53293},
         {3.70751, 2.38737, 4.1709, 4.90903, 4.67366}, {3.67565, 2.65145, 2.04935, 4.56647, 3.17202}}

Out[3]= -320.829

Out[4]= {{0.406796 + 0. i, 0.301827 + 0. i, 0.392984 + 0. i, 0.595635 + 0. i, 0.483942 + 0. i},
         {0.275675 + 0. i, 0.69261 + 0. i, -0.351355 + 0. i, -0.526137 + 0. i, -0.209819 + 0. i},
         {0.707683 + 0. i, -0.19905 + 0. i, -0.379015 + 0. i, 0.261047 + 0. i, -0.49776 + 0. i},
         {0.147057 + 0.0435856 i, -0.1607 - 0.16449 i, 0.684096 + 0. i, -0.347165 - 0.36942 i, -0.106206 + 0.432818 i},
         {0.147057 - 0.0435856 i, -0.1607 + 0.16449 i, 0.684096 + 0. i, -0.347165 + 0.36942 i, -0.106206 - 0.432818 i}}

Out[5]= {15.2 + 0. i, 4.47284 + 0. i, -1.82789 + 0. i, -1.06866 + 1.19984 i, -1.06866 - 1.19984 i}
```

3

$\sum_{i=0}^{10} \frac{(-1)^i}{i!} x^i = 0$
Plot all roots of the equation on the complex plane (as result to provide exported file)

4

Using ContourPlot[] and Manipulate[] to estimate R which provides exactly 2 solution of the following system

$$\begin{cases} x^2 + y^2 = R^2 \\ xy = 1 \end{cases}$$

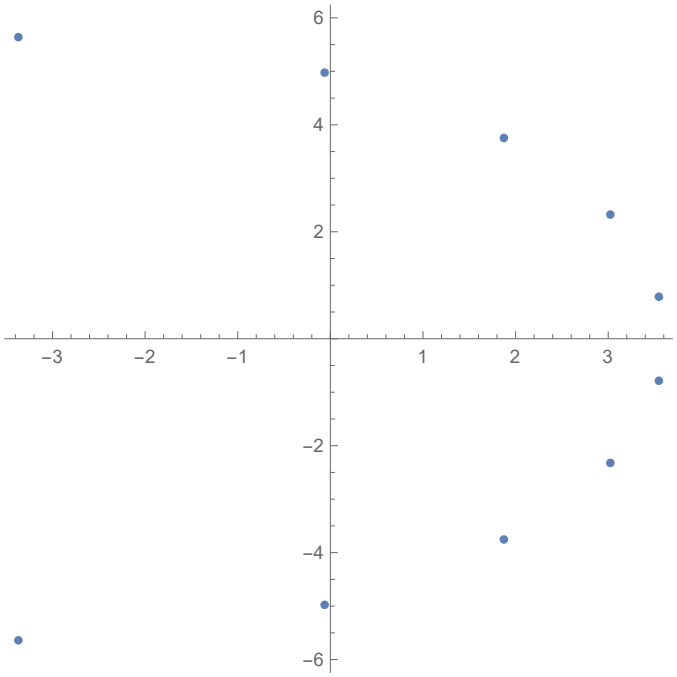

Figure 1: Output of 3

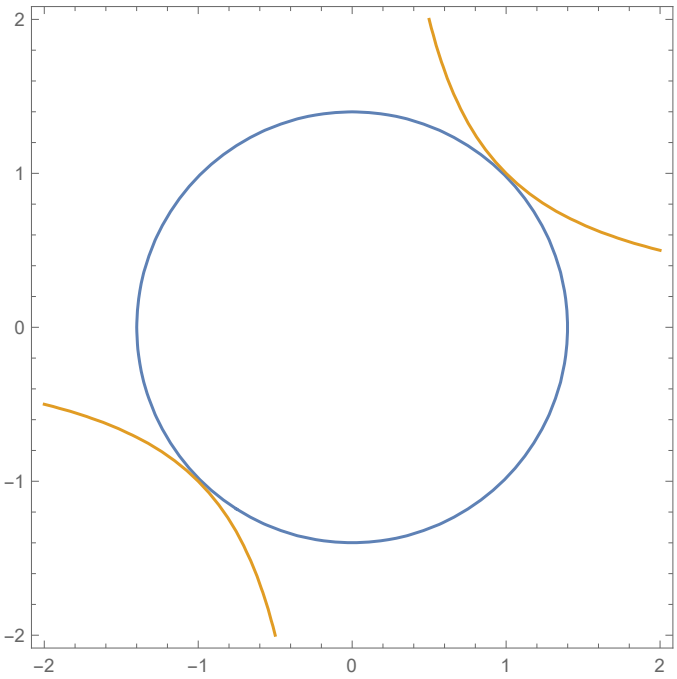

Figure 2: Output of 4, R=1.4