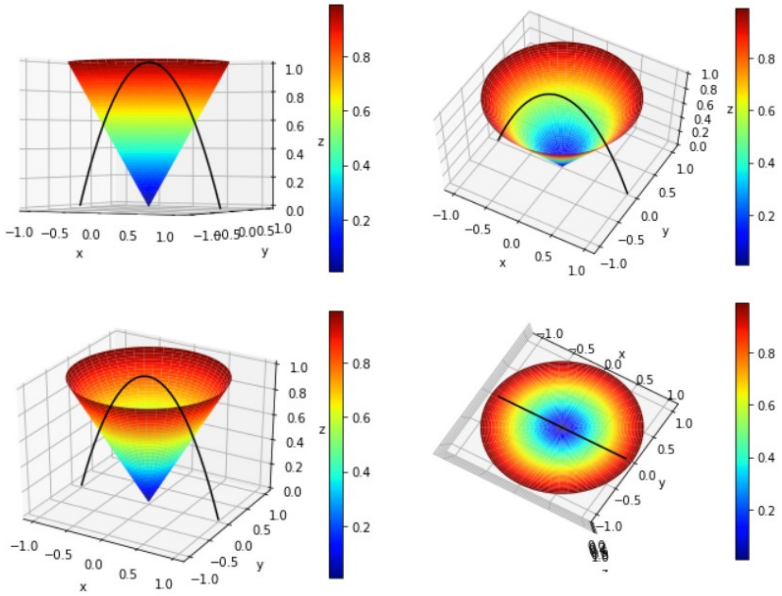
Homework 3: Assign 10/4/17, due 10/11/17

Question 3.1: Make the following plot by using python library. Import the library by
`from mpl_toolkits.mplot3d import Axes3D`
You are allowed to use internet, google, go through stackoverflow and matplotlib documentation if needed. Notice that x and y axis have only 5 tick from -1 to 1. Notice also that the edge of the cone is not distorted. For line plot in 3D space, you may use .plot instead of .plot_surface .
Score distribution.
The code MUST generate 4 pictures and ALSO 4 picture files (.png).

plotting cone: 40%
plotting parabola curve: 30%
adjust the number of ticks to be just 5 tick for x and y: 10%
Show color bar: 10%
Show labels that are not overlapped with ticks: 10%

If you do not have all 4 pictures, your score will be reduced accordingly.



Equation for cone is just z = x^2 + y^2, and for the parabola line, it is just z = -x^2 + 1
color map is set to be ‘jet’

Question 3.2: Generate polynomial degree 6 of your choice. Make sure that your polynomial function cross with x-axis at least 4 times (have at least 4 roots).

3.2a: Use Scipy / Numpy function to calculate all roots of your polynomial function
3.2b: Use Sympy to get the analytical solutions for your roots
3.2c: Create `class` name `graph`. Once object is assigned to be `graph` object (that you created), this object must have the method (function) to generate graph with different line type and option. This object can do 2 task. Task 1, generate 2D plot (for line, dot, or scatter of dots). Task 2, generate several 3D plots at various angle. Example 1:

```
x1y1 = graph(x,y)
x1y1.scatter(color = ‘red’, title = ‘graph x1y1’)
#the above line generate scatter graph from x1y1
```

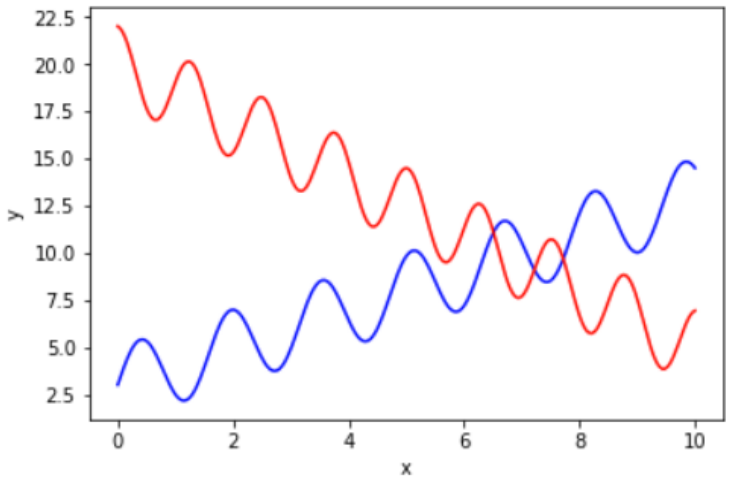
Example 2:

```
graph2 = graph(x,y,f_xy_function)
graph2.three_d([30,40,50])
#after running two line above, your object (graph2) create three 3-D
graph at the 30,40, and 50 degree.
```

3.2d: Use object graph that you create to show graph of your polynomial degree 6 function. Whenever the graph cross with x-axis, put a visible red dots there.

Question 3.3: With a proper import statement, the following code will generated graph as shown below

```
x = np.linspace(0,10,300)
y = (3 + x)+2*np.sin(4*x)
y2 = (20 - 1.5*x)+2*np.cos(5*x)
plt.figure()
plt.plot(x,y,'b-')
plt.plot(x,y2,'r-')
plt.xlabel('x')
plt.ylabel('y')
plt.show()
```



Your tasks are

3.3a: use Sympy to find the cross point
3.3b: use Scipy to find the cross point
3.3c: make green dots (3 dots) on the point where red and blue graphs crossed each other.

Please note that this should not take more than 2 hours for each question. If you know how to do it, it may just take 5 – 10 minutes each.