HW4

February 26, 2017

0.1 Exercises

Exercise 1: Write a function that takes as an argument a positive integer, and generates a list of integers between 0 and that number, separated by 1. That is, if you entered 5, the function should generate

```
0,1,2,3,4,5
```

```
In [15]: def generate_list(max_num):
             return list(range(max_num+1))

         #testing code
         print(generate_list(5))
```

```
[0, 1, 2, 3, 4, 5]
```

Exercise 2:
Create a 1-d numpy array (call it `ts` for timestamps), with increasing integers from 3 to 300 (including 3 but not 300) with increment of 3, and print the array

```
In [16]: import numpy as np
         from __future__ import print_function #clean up the print functions

         ts = np.arange(3, 300, 3)
         print (ts)
```

```
[  3   6   9  12  15  18  21  24  27  30  33  36  39  42  45  48  51  54
  57  60  63  66  69  72  75  78  81  84  87  90  93  96  99 102 105 108
 111 114 117 120 123 126 129 132 135 138 141 144 147 150 153 156 159 162
 165 168 171 174 177 180 183 186 189 192 195 198 201 204 207 210 213 216
 219 222 225 228 231 234 237 240 243 246 249 252 255 258 261 264 267 270
 273 276 279 282 285 288 291 294 297]
```

Exercise 3
Modify the above plot in the following ways:
Add a title to each subplot, and the figure as a whole

Label all axes

Modify the x-labels on the lower-left plot such that there is a tick every 0.5 points (0, 0.5, 1, 1.5, etc).

```python
In [1]: %matplotlib inline
        # Import numpy and pyplot
        import matplotlib.pyplot as plt
        import numpy as np
        from __future__ import print_function
        # Import gridspec
        import matplotlib.gridspec as gridspec

        t = np.arange(0., 5., 0.01)

        fig=plt.figure()
        # Create gridspec object and define each subplot
        gs = gridspec.GridSpec(2, 2, wspace= .5, hspace =.5)
        ax0 = plt.subplot(gs[0, 0]) # Top left corner
        ax1 = plt.subplot(gs[0, 1]) # Top right corner
        ax2 = plt.subplot(gs[1, :]) # Bottom, span entire width

        ax0.plot(t, np.cos(5 * t), c='b')
        ax1.plot(t, np.exp(-1 * t), c='g')
        ax2.plot(t, np.cos(5 * t) * np.exp(-1 * t), c='k')

        #add a title to each subplot
        ax0.set_title('cosine')
        ax1.set_title('hyperbolic')
        ax2.set_title('damped cosine')

        #add title to whole figure
        fig.suptitle('k3wl Gr4ph5')

        #label all axes
        ax0.set_xlabel('X Axis')
        ax1.set_xlabel('X Axis')
        ax2.set_xlabel('X Axis')
        ax0.set_ylabel('Y Axis')
        ax1.set_ylabel('Y Axis')
        ax2.set_ylabel('Y Axis')

        #modify x-labels on bottom plot so that there's a tick every .5 points
        ticks = np.arange(0, 5.5, .5)
        ax2.set_xticks(ticks)

Out[1]: [<matplotlib.axis.XTick at 0x1fcec232c88>,
         <matplotlib.axis.XTick at 0x1fcec4fb9e8>,
         <matplotlib.axis.XTick at 0x1fcec23a400>,
```

```
<matplotlib.axis.XTick at 0x1fcec987d30>,
<matplotlib.axis.XTick at 0x1fcec98f748>,
<matplotlib.axis.XTick at 0x1fcec994160>,
<matplotlib.axis.XTick at 0x1fcec994b38>,
<matplotlib.axis.XTick at 0x1fcec99c550>,
<matplotlib.axis.XTick at 0x1fcec99cf28>,
<matplotlib.axis.XTick at 0x1fcec9a2940>,
<matplotlib.axis.XTick at 0x1fcec9a9358>]
```