Homework assigment 0-A

1. Get the UNAM internet connection (RIU).
2. Install
    - Install Visual Studio Code.
    - Install Zeal (Dash for Mac) offline documentation.
    - Install Anaconda Python 3.x.

Homework assigment 0-B

For all of the following excercises, use only paper and pen(cil) .

1. Sofware for this course [installation estimated time: 1-3 hrs]
   2. Create a GitHub account.
   3. Install
      1. **Linux**
         1. `>_ chmod u+x install_ubuntu_1804.sh && bash install_ubuntu_1804.sh`
      2. **Windows**
         1. Install Git.
         2. Visual C++ Redistributable for Visual Studio 2015.
         3. Visual C++ Redistributable Packages for Visual Studio 2013.
         4. Visual Studio
         5. **Intel** and/or **Nvidia** drivers from nvidia.com. Refer to TensorFlow's GPU installation instructions for more details on GPU speed up.
   3. Create an Anaconda virtual environment with the required packages (install_python_ml_class_geo.yml see animated .gif)
      1. Test jupyterLab (Open) `>_ jupyter lab` .
      2. Test TensorFlow installation `>_ python -c 'import tensorflow as tf;print(tf.__version__)'` (See animated .gif)

Homework assigment 0-C

2. For $f(x) = x^2 - 6x + 5$, do the following:
   i. Compute the derivative, find the minimum and/or maximum, and the intersection with the x and y axis.
   ii. Plot $f(x)$
3. Find the gradient (∇) of $f(x, y) = x^2 + 9y^2$. Sketch the contour lines of f.
4. If
   $$x = \begin{pmatrix} 1 \\ 2 \\ \vdots \\ 6 \end{pmatrix}, \theta = \begin{pmatrix} \theta_1 \\ \vdots \\ \theta_n \end{pmatrix}, A = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 4 & 6 & 8 & 10 & 12 \\ \vdots & & & & & \\ 5 & 10 & 15 & 20 & 25 & 30 \end{pmatrix}$$
   Do the following matrix operations
   i. A^T
   ii. Ax
   iii. $\theta^T x$. $\theta = (\theta_1, \ldots, \theta_n)^T$, $x = (x_1, \ldots, x_n)^T$
   iv. $x^T x$, where $x = (x_1, \ldots, x_n)^T$
5. Write in matrix form the following system of equations and solve it.
   $3x_1 + 6x_2 = 56$
   $-5x_1 + 5.7x_2 = 20$
6. Plot the vector $(4, 3)$ and find a unit vector orthogonal to it.
7. Find the orthogonal projection of $(4, 1)$ over $(3, 4)$, and draw the vectors.

8. Compute the mean ($\bar{X}$), variance (σ^2) and standard deviation (σ) of the following set $\{-2, 2, 4, 5.6, 4.9, 6.3, 8.5, 15\}$.