ECON408: Assignment 0

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Setup

1. Install Julia (with Jupyter and/or VS Code as you wish) and git.
   - See here for very instructions and links.
   - VS Code is optional but recommended.
   - Installing Conda with Jupyter is also optional if you use VS Code, but recommended
2. Clone the repository for the lecture notes
   - Either in VS Code with the `> Git: Clone` or using git directly: `git clone https://github.com/quantecon/lecture-julia.notebooks`

Q1

Create a new Jupyter notebook in Julia with the following:

1. A markup cell with some math text with the Pythagorean theorem (e.g. $x^2 + y^2 = z^2$)
2. A function which which takes the sides of the rectangle and calculates the hypotenuse (i.e., code up $z(x, y) = \sqrt{x^2 + y^2}$)
3. Calculate $z(3, 4)$

Q2

Plot $f(x) = x^2$ for a grid of 20 points of $x \in [0, 1]$. You can make a grid with `range(0, 1, 20)`

Q3

Write a function that draws a 100 random normal variables (use `randn(100)`) and manually calculates the mean and variance. By manually I mean using sums/etc. to implement the standard formulas for mean and variance of your choosing.

Q4

Take the following stochastic process

$$x_{t+1} = \mu x_t + \sigma w_{t+1}$$

where $w_{t+1} \in N(0,1), \sigma = 0.1$, and $\mu = 1$.

Let $x_0 = 0$ and $T = 20$. Use a for loop to simulate $\{x_0, ... x_T\}$ drawing a random normal with `randn()` for each time step.

Plot $\{x_0, ... x_T\}$ adding on a legend, title, xlabel, and ylabel. For the x-axis you can just use `0:T` or something like that (careful to align the length of your simulation) or feel free to skip the labeling of the first point at `t=0` (e.g. `plot(x)` it will plot with a `1, 2, ...N` on its axis if `x` is a vector of length `N`)