1. Write an empirical function in an ipython notebook which returns the probability of the interval from $x$ to $y$ under the standard normal distribution (which has mean 0 and variance 1). Use the function `np.random.normal(mean,standardDeviation,numberofsamples)` to sample from a normal distribution for your empirical estimate of normal probabilities.

2. Z-tables like the table under [http://www.stat.ufl.edu/~athienit/Tables/Ztable.pdf](http://www.stat.ufl.edu/~athienit/Tables/Ztable.pdf) are not nice to read. Write a function in an ipython notebook which empirically gives you the standard normal probabilities for a given $z$, just as in the linked table. Use your code to estimate the probabilities for $z=-3.4,-3.3,...,3.3,3.4$ (in steps of 0.1). They should roughly correspond to the values given in the z-table linked above.

3. A study was conducted to determine if meditation has a positive impact on the performance in a memory task. The goal of this study is to establish that meditation has a positive impact on performance (that’s their research hypothesis). A random group of 100 students was assigned to the meditation group that had to meditate before the task. 70 of them successfully completed the task. The size of the control group of students was 40 and 16 successfully finished the task. Test at a 5 percent level of significance if meditation increased the performance in the memory task.

4. We estimate the mean of the body weight of all women in a population based on a sample of size 40, i.e. we got the body weight of 40
random female persons. Body weights are normally distributed, the true population mean is $\mu = 60$ and the standard deviation is $\sigma = 10$. The sample mean follows a probability distribution – which distribution is it?

5. We now get a sample of 50 persons from a different population and suspect that the sample is from a population which has a higher body weight (but the same variance). Which sample mean do we need to observe in order to reject the null hypothesis that the mean of both populations is equal at a significance level alpha?

6. Calculate the power of the test given that the real mean of the second sample is from a population with mean $\mu = 65$. 