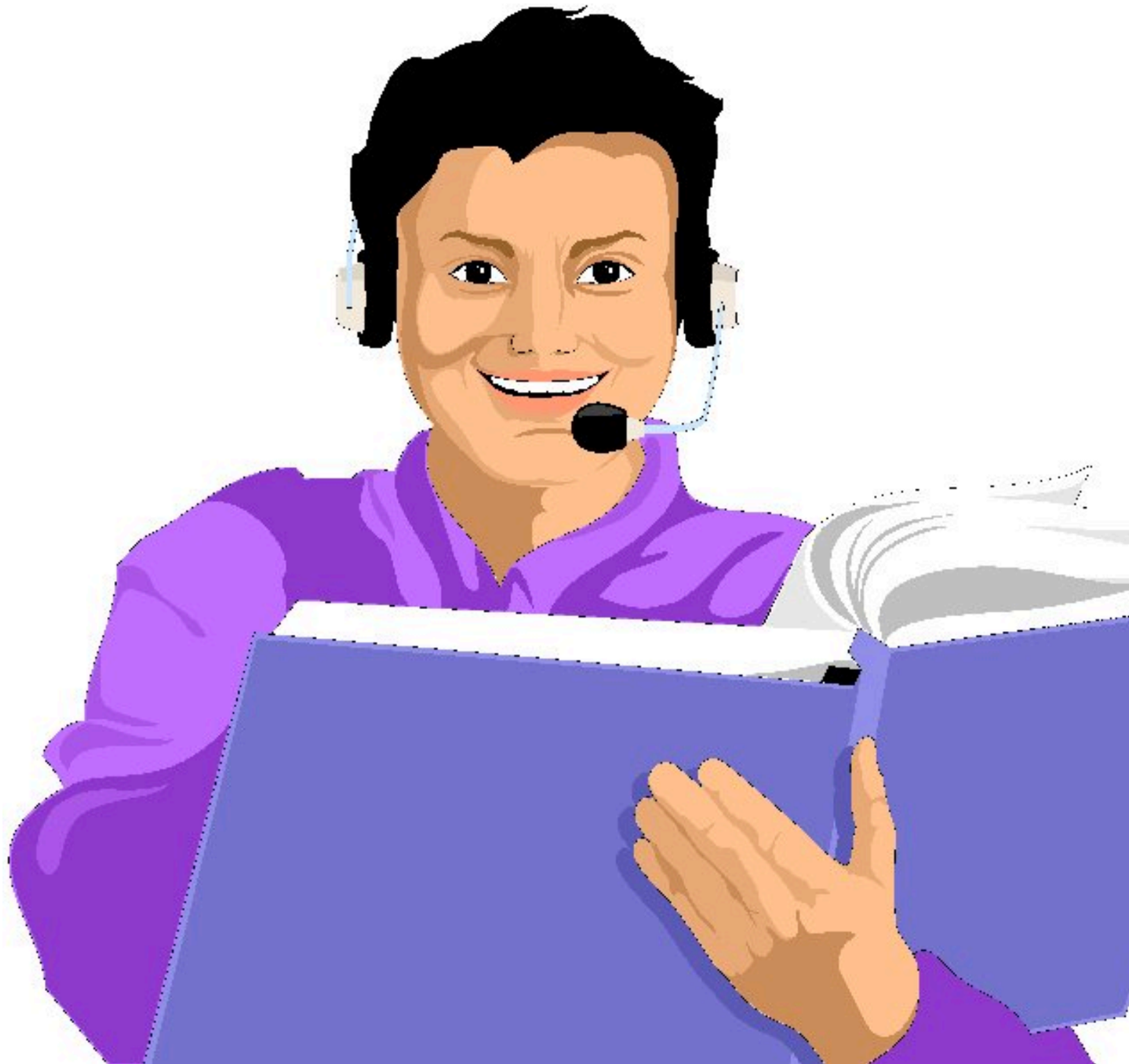
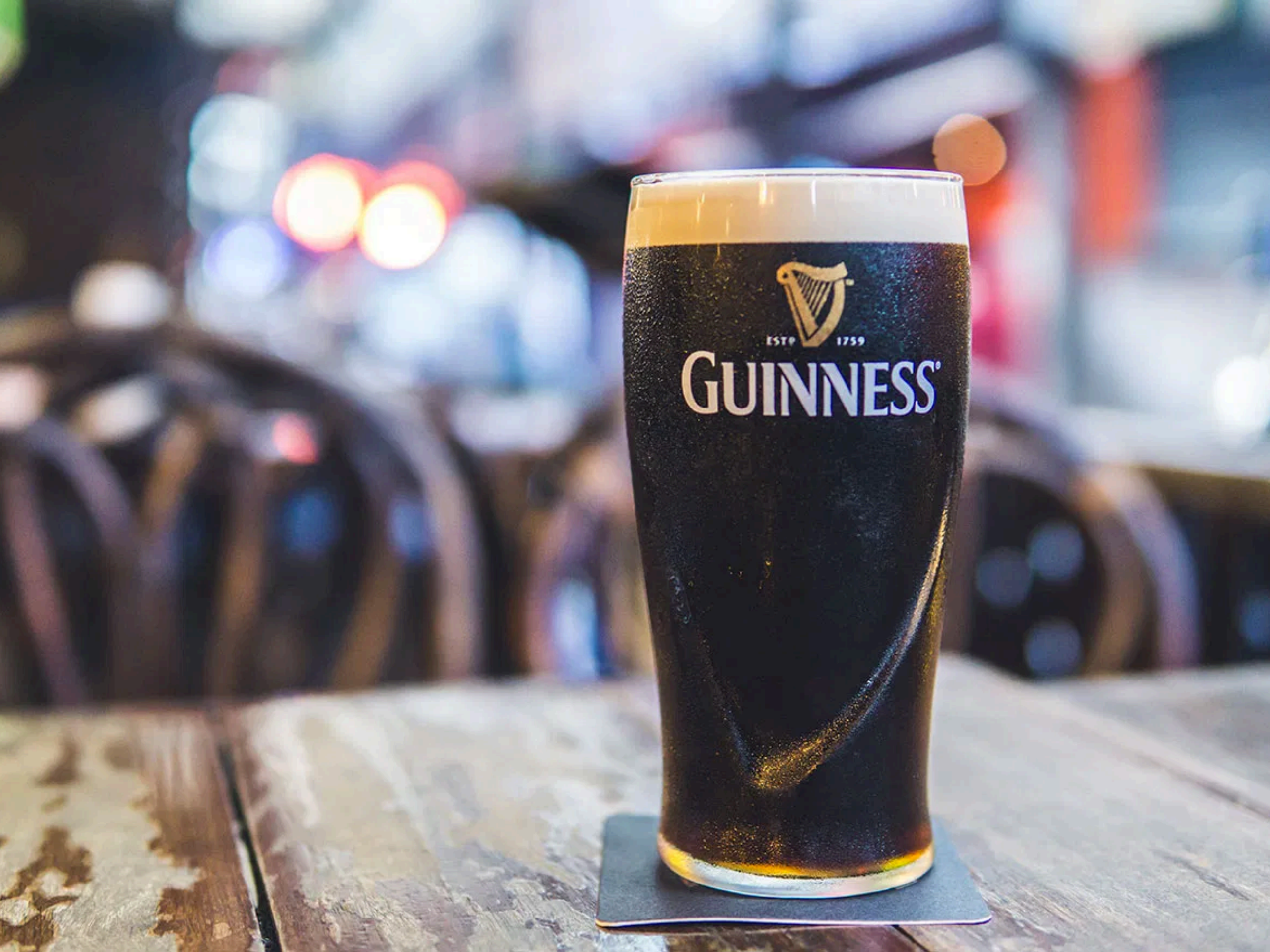
MORE STATISTICS WITH GAUSSIANS

10.9.2020

PROBLEM SET 3

* how’s it going?




ESTD 1759
GUINNESS

T-TEST

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aka “Student”

* Let’s say we have two sets of samples from different gaussian random variables

* We want to know whether the means of these two samples are equal, or if one is greater than the other

T-TEST

* the t-test uses the **t statistic**, which is defined as:

$$t = \frac{Z}{s} = \frac{\bar{X} - \mu}{s/\sqrt{n}}$$

T-TEST

* under the null hypothesis, the t statistic follows the t distribution, which has one parameter (the number of degrees of freedom)

T-TEST

* the t-test is implemented in scipy.stats

* **scipy.stats.ttest_ind** : tests whether two different (independent) samples have the same mean

T-TEST

* scipy.stats also includes other flavors of t-test which are useful

* **scipy.stats.ttest_1samp** : tests whether the mean of your sample is different from a given value (assuming your sample has a gaussian distribution)

PAIRED T-TEST

* scipy.stats also includes other flavors of t-test which are useful

* **scipy.stats.ttest_rel** : aka the paired t-test, tests whether two *related* sets of samples have different means

PAIRED T-TEST

* **fMRI example:** suppose you measure the response of each voxel in a given brain area under condition A, and then again under condition B. you now have 2 different samples, but they are related

* testing for the difference of the two populations could obscure a difference between the conditions

PAIRED T-TEST

* **the solution:** compute the difference between resp(A) and resp(B), then do a t-test on whether that difference is different from zero

END