Homework 1

## (15 points) Problem 1: Theory and Computation (Means and Medians):

Award 3 points for overall attempts/completion.

A (2): 1 per result

B(2): 1 per result: both a little tricky, don’t deduct if strict inequalities used.

C(2): Deduct 1 if np.var is used without ddof=1.

D(2): Deduct .5 per error.

E and F 2 parts each: grade for proper intuition, maybe deduct .5 for minor errors in interval.

(15 pts) Problem 2: Theory and Computation (Scaling)

(9) points total for doing the calculations in A/B/C. Deduct 2 if any interpretation suggest that machine precision terms such as xx\*10^{-15} are NOT zero

D(2) For their interpretation. Main idea should be about removing units, comparing shapes.

E(2) Anything reasonable for numbers/units in the given ranges.

F(2) 1 for an attempt, minor deductions for poor notation/not using sums

## (15 pts) Problem 3: Computation (Streaming Means)

A and B (3 each): deduct 1 for incorrect exact results, 2 for incorrect *order*

C(3): eyeball function for completeness, not using built-in functions

D(2): spot check values

E(2): spot check values

F(2): answer should be much smaller, and discussion or mention of lower order is important

Homework 2

## (25 points) Problem 1: Titanic

A(2): Loading and single calculation

BC(3 each): these are loading and scrubbing. Check for the final number of rows; if they’re off awar partial credit for any scrubbing they attempted.

D(8 total): Half for the “by gender” values, half for breaking down to the gender-within-class values

E(4): Give half for making any histogram, minor deductions for missing overlaps, labeling axes, etc.

F(2): Y-axis needs to make sense: some mention of asymmetry is needed here.

G(3): Actually read this answer and award credit for any amount of critical logic/thought. It’s ok to conclude either way, but final answer should suggest that it’s nuanced and we’re probably lacking at least *some* information.

(20 pts) Problem 2: Weather

A(6): Lot of scrubbing here. If their box plots ended up with only 4 months, deduct 4: they didn’t fix the strings. If the asterisks tripped them up only deduct 2: these weren’t well described in the prompts

B(2): Can be as simple as one line of code for the plot, plus axes

C(4): Give 2-3 for a good attempt to combine the months. Easiest way is a new data frame, but give good marks for trying to work with the original frame

D(3): 2 for numbers, 1 for commentary

E(3): 2 for the original histogram, 1 for making the outlier visible or highlighted in *any* way.

F(2): Any reasonable plain-English sentence is fine here.

Homework 3

## (25 points) Problem 1: Game Simulations

A(3): They could have just looked up the results, so deduct 2 if there’s literally no explanation of the 4 terms, and deduct 1 if the explanation is lacking.

B(8): This is not trivial. Check 2 points each on: function uses 52 cards not only 13 face types, some attempt to parse 3-of-a-kind plus 2-of-a-kind, 2 points on general syntax/clarity, 2 points on final answer.

C(6): Lots of ways to approach this, many may be harder to read than the solution. If they have a good logical approach to the problem, give at least 4/6. Last 2 points as final answer and *comparing*  to the given “if independent” result, with some logic.

D and E(8): Again, many ways this might have been done. Give 3 points for the simulation setup and code being done in a reasonable way, 3 more for setting up a data structure that they could plot and plotting it. 2 total for the two final answers of ½ and 1/3.

(20 pts) Problem 2: Repeated Bayes

Classically this style of problem is hardest in the notation. Try to award lots of partial credit if they made generally probability-sound calculations, but maybe missed exactly what the L\_n and such events denoted.

A B and C (3 each): award a point for effort, a point for right idea/setup, and a point for result

D(3): This is non-trivial, so give 1.5 points for trying to set it up, then spot check numerator/denominator each for minor deductions.

E(6): Notation is hardest here: should look just like D with some exponents. 3 For the math, 3 for typing that exact function into python

F(2): Using the function and then stating the result in plain English.

(5 pts) Problem 3: Single Bayes

4 for the calculation and 1 for coherent notation