STAT 3010: Assignment 1

Spring 2024: Due Jan. 28, 2024

Please answer each question as completely as possible. Solutions must be typed and submitted to Canvas by 11:59pm CST on the due date.

1. Consider the following stem-and-leaf plot. Provide the 5-number summary for the data.

   The decimal point is 1 digit(s) to the left of the |

   3 | 1
   3 | 56678
   4 | 000112222234
   4 | 5667888
   5 | 144
   5 | 58
   6 | 2
   6 | 6678
   7 |
   7 | 5

2. In the article below, researchers concluded that physical exercise can keep the brain sharp into old age. After reading the study, answer the following questions:
   (a) Do you think the conclusions derived from studying rats would be valid for humans?

   (b) What factors other than exercise might influence the results of the study?

Building Biceps Could Boost Brainpower, Too

By Ellen Hale, Gannett News Service

Exercise can keep the brain sharp into old age and might help prevent Alzheimer's disease and other mental disorders that accompany aging, says a new study that provides some of the first direct evidence linking physical activity and mental ability. The study, reported in the journal *Nature*, is the first to show that growth factors in the brain compounds responsible for the brain's health can be controlled by exercise. Combined with previous research that shows exercisers live longer and score higher on tests of mental function, the new findings add hard proof of the importance of physical activity in the aging process. "Here is another argument for getting active and staying active," says Dr. Carl Cotman of the University of California at Irvine. Cotman's research was on rodents, but the effects of exercise are nearly identical in humans and rats, and rats have "surprisingly similar" exercise habits, Cotman says. In his study, which promises to be controversial, rats were permitted to choose how much they wanted to exercise, and each had its own activity habits, just like humans. Some were 'couch' rats, Cotman says, rarely getting on the treadmill; others were 'runaholics', with one obsessively logging five miles every night on the wheel. "Those little feet must have been paddling away like crazy,' ' Cotman says. The rats that exercised had much higher levels of BDNF (brain-derived neurotrophic factor), the most widely distributed growth factor in the brain and one reported to decline with the onset of Alzheimer's. Cotman predicts there is a minimum level of exercise that provides the maximum benefit. The rat that ran five miles nightly, for example, did not raise its level of growth factor much more than those that ran a mile or two.

Source : *USA Today*, Jan. 12, 1995.

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3. Temperature transducers of a certain type are shipped in batches of 50. A sample of 60 batches was selected, and the number of defective transducers in each batch was determined. The data are given in the file Transducers.csv.

   (a) What proportion of batches in the sample have at most 5 defective transducers?

   (b) Draw a histogram of the data using density on the vertical scale, and comment on its features (copy and paste from Rstudio).