Name: _____

Stat 101
Summer 2023 Session 1
Dr. Lily Yen

Test 2-1

Show all your work

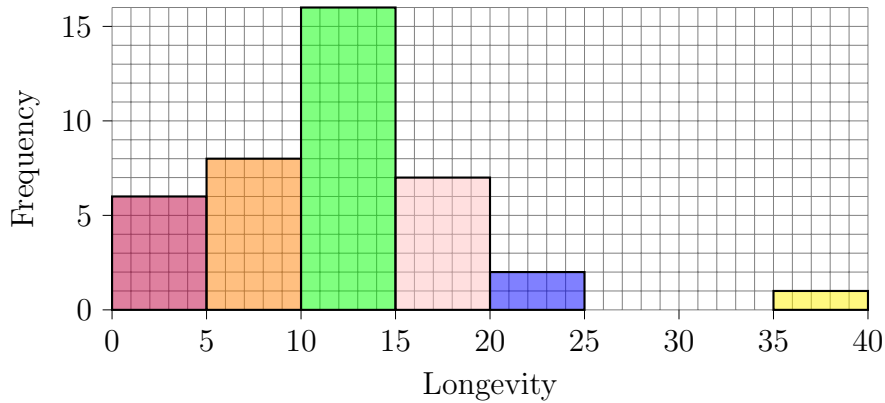Number: _____

Signature: _____

Score: ___/35

Include all spreadsheet functions whenever they are used.

Problem 1: The histogram shown represents the longevity of mammals, namely, typical lifespan, in years, for 40 species of mammals. The vertical axis represents the number of species. Answer the following.


a. What fraction of these species of mammals have a lifespan of less than 15 years?

b. What is the probability that a randomly chosen mammal from this sample of species has a lifespan of more than 20 years?

Score: /2

Problem 2: Cholesterol levels for women aged 20 to 34 follow an approximately normal distribution with mean 185 milligrams per decilitre (mg/dl). Women with cholesterol levels above 220 mg/dl are considered to have high cholesterol. About 18.5 % of women fall into this category.

a. Mark on the normal curve information given in this problem including shading an appropriate region.
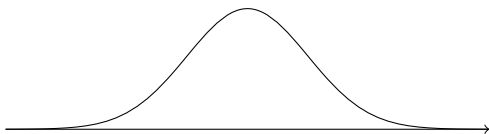
b. Find the standard deviation of the distribution of cholesterol levels for this group of women. Provide a 2-decimal place accuracy.
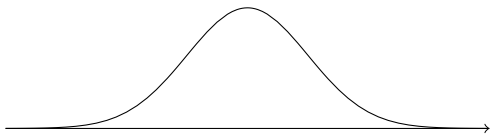
Score: /4

/6

Problem 3: In Vancouver's BMO Marathon in May, friends, Matt and Sarah both completed the 10-km fast walk. Matt joined Men's ages 30 to 34 group while Sarah, in Women's ages 25 to 29 group. Matt finished his walk in 1:22:28 = 4948 seconds while Sarah, in 1:31:53 = 5513 seconds. According to the finishing statistics of their respective group, answer the following questions. Provide 6-decimal place accuracy for probabilities.

- Mean finishing time of Men's ages 30 to 34 group is 4313 seconds, with $\sigma = 583$ seconds.

- Mean finishing time of Women's ages 25 to 29 group is 5261 seconds with $\sigma = 807$ seconds.

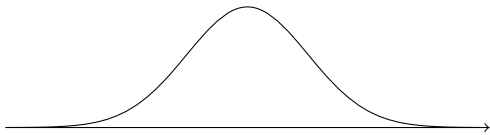- The distributions of finishing times for both groups are approximately Normal.

a. What percentage of **female** participants completed the race in an hour or less?
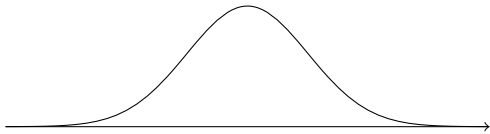
b. Find the cutoff time for the fastest 5% of athletes in the **women's** group.

c. What is the probability that a randomly chosen **male** athlete completed the race in more than an hour?

Score: /6

Problem 4: It is known that 8% of men are colour blind.

a. In a random sample of 10 men, find the probability that exactly 3 men are colour blind.

b. In a random sample of 30 men, find the probability that 4 or fewer men are colour blind.

c. In a random sample of 200 men, find the probability that a quarter or more of these men are *not* colour blind.

Score: /6

/12

Problem 5: In a random sample of 765 adults in the United States, 322 say they could not cover a $400 unexpected expense without borrowing money or going into debt.

    a. What population is under consideration in this data set?

    b. What parameter is being estimated?

    c. What is the point estimate for the parameter?

    d. What is the name of the statistic we can use to measure the uncertainty of the point estimate?

    e. Computer the value from part d for this context?

    f. A cable news pundit thinks the value is actually 50 %. Should she be surprised by the data?

    g. Suppose the true population value was found to be 40 %. If we use this proportion to recompute the value in part e using $p = 0.4$ instead of $\hat{p}$, does the resulting value change much?

Support the last three parts with relevant computations accurate to 6 decimal places.

Problem 6: A poll conducted in 2013 found that 52 % of U.S. adult Twitter users get at least some news on Twitter, and the standard error for this estimate was 2.4 %. Identify each of the following statements as true or false. Provide an explanation to justify each of your answers.

    a. The data provide statistically significant evidence that more than half of U.S. adult Twitter users get some news through Twitter. Use a significance level of $\alpha = 0.01$.

    b. Since the standard error is 2.4 %, we can conclude that 97.6 % of all U.S. adult Twitter users were included in this study.

    c. If we want to reduce the standard error of the estimate, we should collect less data.

    d. If we construct a 90 % confidence interval for the percentage of U.S. adult Twitter users who get some news through Twitter, this confidence interval will be wider than a corresponding 99 % confidence interval.

Score: /4

Problem 7: A study suggests that 25 % of 25 year olds have gotten married. You believe that this is incorrect and decide to collect your own sample for hypothesis test. From a random sample of 25 year olds in census data with size 776, you find that 24 % of them are married. A friend of yours offers to help you with setting up the hypothesis test and comes up with the following hypotheses. Indicate any errors you see.

$$H_0 : \quad \hat{p} < 0.24$$
$$H_A : \quad \hat{p} > 0.24$$

Score: /4

/8