PSYC/NEUR2002A: Assignment 1 (Fall 2014) (50 points: 10% of final grade) ANSWER KEY

This assignment covers material from chapters 1 through 5 in the textbook, and the lecture material from the first 5 classes. This assignment will be graded out of 50 points and is worth 10% of your final grade in the course.

*You will have **one week** to complete and upload it to CULearn using the assignment tool. The assignment is due on September 23rd, by 4 p.m. SHARP!! This deadline is FIRM. Do not wait until 3:58 p.m. on the 23rd to upload your assignment. Should you run into any difficulties, you will surely miss the deadline. **Late assignments will not be accepted.***

Formatting: All assignments should be submitted as an attachment through the CULearn assignment tool. Emailed assignments will not be accepted. Your assignment should be written in Microsoft Word, using 12-point font. When completing questions that require you to work through an equation, BE SURE TO SHOW ALL OF YOUR WORK. YOU WILL LOSE POINTS IF YOU DO NOT!. Your word processor can be used to type equations, including the appropriate symbols. Use complete sentences in your written responses (no point form).

All of the work on this assignment should be your own, independent work! See syllabus for information on Carleton's Academic Integrity policy.

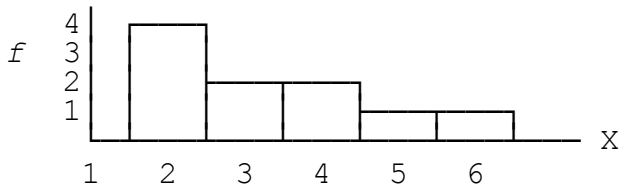
1. A health psychology researcher surveys stress levels among working fathers and working mothers (stress levels are rated on a scale from 1 = low stress to 10 = high stress). She finds that fathers have a mean stress rating of M= 7 and SD= 1; Mothers report a mean stress level of M= 5 and SD=3. Describe, ***in one or two sentences***, what these numbers mean to someone who doesn't know anything about statistics. **(2 points)**

   1 point for describing the differences in means, 1 point for describing the differences in SD.
   SAMPLE RESPONSE: While working fathers tend to report higher levels of stress than working mothers (M=7 vs. M=5), there is greater variability in reported stress among mothers (SD=3) compared to fathers (SD=1). Could also say that the distribution of stress scores is more spread out for mothers than for fathers.

2. A sample of *n* = 15 scores ranges from a high of X = 11 to a low of X = 3. If these scores are placed in a frequency distribution table, how many X values will be listed in the first column? **(1 point)**

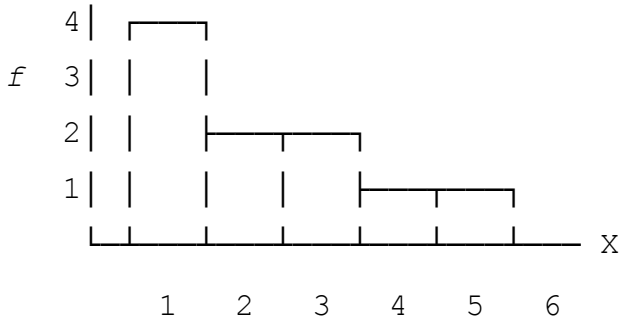
   ANSWER: 9 (11, 10, 9, 8, ……3) only need to provide the correct answer for 1 point

3. How many individual scores are in the following distribution? **(1 point)**



ANSWER: N=10

4. For the following distribution, what is ΣX? **(1 point)**



ANSWER: ΣX = 23 (6X0) + (5X1) + (4 X 1) + (3X2) + (2 X 2) + (1X4) = 23

4. You ask a friend about the results from a recent opinion poll held in your statistics class. All students rated their anxiety about taking a statistics course on a scale ranging from 1 'not at all anxious' to 10 'extremely anxious'. He tells you that there was a bimodal distribution (Mode1 = 2 and Mode2 = 9). Explain what your friend means by this to someone who doesn't know anything about statistics. **(2 points)**

ANSWER: This means that there were two modes in the distribution. In other words, two responses were very common in the class. Students seemed to either be very confident about the course (Mode=2) or to feel quite anxious (Mode=9).

6. A researcher wants to know whether music exposure affects problem-solving ability in rats. A group of rats is randomly assigned to either hear or not hear music while navigating a complicated maze. The researcher measures the amount of time, in seconds, it takes each rat to complete the maze.

a) Is this an experimental or a nonexperimental study? Explain your answer. **(1 point)**

ANSWER: The study is an experiment because the rats were randomly assigned to hear or not hear music.

b) For the above study, identify the independent and dependent variables, and for each, note whether it is measured on a continuous or a discrete scale. **(2 points)**

ANSWER: One point each for I.V. and D.V:
I.V.: Music exposure (rats either hear, or don't hear music) This is a discrete scale.
D.V.: Amount of time in seconds it takes rat to complete the maze (continuous)

7. Last week I asked a sample of 5 of my closest friends to tell me how many pairs of shoes they own. I recorded the information and calculated the mean and standard deviation for this sample. I found that M= 6 and s= 0. Explain these results in less than three sentences to someone who doesn't know anything about statistics. **(2 points)**

ANSWER: My friends own an average of 6 pairs of shoes. The standard deviation is 0. This means there is no variability in the sample, or no deviation from the Mean of 6. Each person in the sample of 5 owns exactly 6 pairs of shoes.

8. What is the preferred measure of central tendency for the following variables? Why? **(4 points)**

a. Citizenships of a group of 25 recent immigrants
ANSWER: Mode (discrete nominal variable)

b. Exam scores out of 100 for a class of 50 Carleton students
ANSWER: Mean (continuous variable, mean is default)

c. Bank balances for 10 Royal Bank customers (9 students, 1 lawyer)
ANSWER: Median (lawyer will have extreme score, skewing the mean)

d. Ages of a group of kids in summer camp
ANSWER: Mean (continuous variable, mean is default. Could also say MODE if they explain that nearly all the kids are the same age)

9. Explain why it is necessary to have more than one standard procedure for defining and measuring central tendency. **(1 point)**

SAMPLE ANSWER: Depending on the characteristics of the distribution, and the scale of measurement being used, one measure of central tendency might better represent a 'typical' value. For example, the mean is not a typical value when there are a few extreme scores in the distribution. The median is a better reflection of the central tendency. The mode is necessary with nominal variables. (For one point, they must indicate 'why' but need not provide all examples provided here.)

10. A normal distribution has a mean of $\mu = 55$ with $\sigma = 2$. What proportion of the population has a score *greater than 58*? (Show your work) **(2 points)**

ANSWER: STEP 1 – COMPUTE Z SCORE (1 point)

$z = (X - \mu)/\sigma = (58 – 55)/2 = 3/2 = 1.5$

STEP 2 – look up in table and report proportion in tail (.067)

6.7% of the population has a score greater than 58.

11. What is the shape of the distribution for the following set of data? (choose one answer. No need to show your work here!) **(1 point)**

a. Symmetrical
b. Positively skewed
c. Negatively skewed
d. Normal

X	f
5	1
4	1
3	2
2	4
1	5

ANSWER: B POSITIVELY SKEWED

12. Provide a realistic example of a *negatively skewed* distribution. Name and describe the variable being measured and the circumstances underlying the negatively skewed scores. **(2 points)**

SAMPLE ANSWER (1 point for realistic variable, 1 point for accurate description): You may get a negatively skewed distribution when measuring "desire to win the lottery" on a scale from "0" no desire to "10" strong desire. I would expect very few people to report low levels of desire to win the lottery and many more people to report a strong desire to win the lottery. Scores would be piled up at the high end of the scale with only a few extreme scores on the low side creating a negative skew in the distribution.

13. Find each value requested in a, b, and c for the set of scores in the following frequency distribution table (SHOW YOUR WORK). **(3 points)**

a. *n*

b. ΣX

c. ΣX^2

X	f
5	2
4	2
3	3
2	5
1	2

a. n = Σf = (2+2+3+5+2) = 14

b. ΣX = (5X2) + (4X2) + (3x3)+(2X5) + (1X2) = 39

c. $\Sigma X^2 = 5^{2+}5^{2+}4^{2+}4^2$ ……..+ 1^2

$= 25 + 25 + 16 + 16 + 9+9+9+4+4+4+4+4+4+1+1 = 131$

14. One sample with *n* = 4 scores has a mean of M = 12, and a second sample with *n* = 6 scores has a mean of M = 8. If the two samples are combined, what is the mean for the combined set of scores? **(1 point)**

ANSWER: must use weighted mean to get 1 point

M = ΣX1 + ΣX2/n1+n2 = (48 + 48)/(4+6) = 96/10 = 9.6

15. In a population of N = 6, five of the individuals all have scores that are exactly 1 point above the mean. From this information, what can you determine about the score for the 6th individual? Explain how you arrived at your answer. **(2 points)**

ANSWER: The 6th score must be five points below the mean. Because the mean acts as the balance point for the distribution, the distance between the mean and scores ABOVE the mean must be equivalent to the distances between the mean and scores BELOW so that together they sum to zero.

16. Suppose you earned a score of X = 62 on an exam. Which set of parameters would give you the highest grade? (Choose, a, b, c ,or d) Show your work for each and explain your final answer**. (2 points)**

a. μ = 60 and σ = 2
ANSWER: Z = (X- μ)/ σ = (62 – 60)/2 = +1.0 (.25 PTS for each correct calculation)

b. μ = 60 and σ = 3
ANSWER: Z = (X- μ)/ σ = (62 – 60)/3 = +0.67

c. μ = 70 and σ = 3
ANSWER: Z = (X- μ)/ σ = (62 – 70)/3 = -2.67

d. $\mu = 65$ and $\sigma = 3$
ANSWER: $Z = (X- \mu)/ \sigma = (62 – 65)/3 = -1.0$

***1 point for correct solution and explanation**. The set of parameters in A would give me the highest grade. These parameters place my score of X=62 the furthest away from the mean in a positive direction with a z-score of 1.0.*

17. What is the most likely shape for a distribution with a mean of 40 and a mode of 45 (choose one)? **(1 point)**

a. Symmetrical
b. Positively skewed
c. Negatively skewed
d. Either positively or negatively skewed

ANSWER: C

18. A population of scores has $\mu = 40$. In this population, a score of X = 46 corresponds to z = +2. What is the population standard deviation? (show your work or explain your answer) **(1 point)**

ANSWER: $\sigma = 3$. IF Z = 2, or 2 SD above the mean is 6 points above the mean, then one standard deviation is equal to half of that, or 3.

19. A statistics student wants to compare his final exam score to his friend's final exam score from a different section, but the two exams were scored on different scales. Using the following information, help the student answer his questions below.

Our student: Final exam score = 85;
Class: $\mu = 70$; $\sigma = 10$.

His friend: Final exam score = 45;
Class: $\mu = 35$; $\sigma = 5$.

a) Compared to the other people in their classes, who did better on the exam? (show all of your work) **(2 points)**

ANSWER: The friend did better on the exam.

Our student, z = 1.50 (85-70)/10 = 1.5; his friend, z = 2.00 (45-35)/5 = 2.0

b) Assuming that the scores from our student's class were normally distributed, what proportion of his class scored *lower than him* on the exam? **(1 point)**

93.33% of the class scored lower than our student on the exam

20. What is the value of SS (sum of squared deviations) for the following sample? Sample: 1, 3, 2, 2 (SHOW YOUR WORK) **(1 point)**

M = ΣX/n = 8/4 = 2

ANSWER: SS = $\Sigma(X - M)^2 = (1-2)^2 + (3-2)^2 + (2-2)^2 + (2-2)^2 = (-1)^2 + (1)^2 + (0) + (0) = 2$

SS = 2

21. A score that is 6 points below the mean corresponds to a z-score of z=-2.00. What is the population standard deviation? **(1 point)**.

ANSWER: The standard deviation is 3 points (corresponds to z=1)

22. A sample consists of the following n=7 scores: 5, 0, 4, 5, 1, 2, and 4. **SHOW YOUR WORK**

a. Compute the mean and standard deviation for the sample **(2 points)**

ANSWER: M = 21/7 = 3 $S = \sqrt{\Sigma(X - M)2/n - 1} = \sqrt{\frac{24}{6}} = 2$

b. Find the z-score for *each score* in the sample **(3.5 points)**

Z = (x-M)/s (.5 points for each correct answer)
5 ----- +1
0------ -1.5
4……. +.5
5------ +1
1------ -1
2------- -.5
4------- +.5

c. Transform the original sample into a new sample with a mean of M=50 and s=10. **(3.5 points)**

X = (z)(s) + M = (z) (10) + 50 (.5 points for each correct answer)

5 ----- 60
0------ 35
4……. 55
5------ 60
1------ 40
2------- 45
4------- 55

23. TRUE or FALSE? For a population with μ = 70 and σ = 5, about 95% of the individuals will have scores between X = 65 and X = 75. (SHOW YOUR WORK) **(1 point)**

ANSWER: z=(65-70)/5 = -1 and z=(75-70)/5 = 1

FALSE (z should be +/- 1.96 to capture middle 95% of distribution)

24. For a population with $\mu = 40$ and $\sigma = 8$, what is the X value corresponding to z = 1.50? **(1 point)**

ANSWER: X = (z)(σ) + μ *= (1.5)(8) + 40 = 12 + 40 = 52*

25. Explain what is measured by the sign of a z-score and what is measured by its numerical value. **(2 points)**

ANSWER: The sign of the z-score tells us whether it is above or below the mean. The numerical value tells us how many standard deviations away from the mean the score is.