Exam #1 practice problems

1. The following is the estimated number of male prison inmates in various age groupings in the United States, in 1984. (1) Calculate the age corresponding to the 80th percentile. (2) What percentile would a 27 year-old male fall on?

Age class	Estimated number (f)	%	c%
65-74	1,185	.35	100
55-64	6,786	1.95	99.65
45-54	18,097	5.20	97.7
35-44	67,866	19.5	92.5
25-34	158,355	45.5	73
15-24	95,687	27.5	27.5
	347,976	100	

answers

1. x = 38.1
2. % = 38.88

2. There are 6 things wrong with the following table, name 4 of them. Circle the errors and explain below why it is wrong. The table concerns data from the U.S Department of Health and Human Services.

Calories[f]	f	% [c]	cp[d]	c%
5000-	5	.005	1065[e]	100
4500-4999	4	.004	1065	99.5
4000-4499[b]	6	.006	1061	99.1
3000-3999	40	.037	1055	98.5
2000-2999	258	.241	1015	94.8
1000-2000[a]	564	.527	757	70.7
0 - 999	193	.180	193	18.0
	1070	1.00		

answers

[a] score cannot reside in 2 intervals

[b] intervals not evenly spaced

[c] heading indicates percentages, column represents proportions

[d] heading indicates cumulative proportions, column represents cumulative frequencies

[e] cumulative frequency does not match frequency total

[f] interval sizes should be adjusted – more than 70% of scores reside in 1st 2 intervals

3. For the following sample of scores, calculate the range, sum of squares, variance, and the standard deviation. If we added 2 points to each of the scores, what would happen to the standard deviation. Explain.

sample scores: 2, 4, 5, 5, 8, 8, 10

answers
range = 9
SS = 46
$s^2 = 7.67$
s = 2.77

4. For the following distribution of scores, calculate the mean, median, and mode.

Score	f
9	2
8	2
7	3
6	0
5	4
4	3
2	4
1	1

answers
mean = 5.05
median = 5
mode = 5

5. Explain the difference between simple random sampling, stratified random sampling, and cluster sampling.

answer
Simple random sampling indicates that all members of the population has an equal chance of being selected into the sample. Stratified random sampling means that subsections (strata) in the population are identified, and an equal number of subjects are randomly selected from ALL strata. Cluster sampling identifies subsections from the population (clusters), and a random sample of some, but not all clusters are selected, and an equal number of subjects are selected from each of the randomly selected clusters.

6. A job applicant is told that she must score at least 2 standard deviations above the mean in a placement test in order to be hired. The individual scores 560 on a test where the mean is 400 and the standard deviation is 60. What z score corresponds to a raw score of 560 on this test?

answer
z = 2.67

7. John was told by his instructor that his z score for a recent test was -1.5 and Cindy was told her z score was +2.5. What test scores did John and Cindy get if the class mean was 60 with a standard deviation of 8?

answer
John scored 48 while Cindy scored 80.

8. Explain why the median is superior to the mean when we have severely skewed distributions?
answer
The median calculates the score that divides the distribution exactly in half. This score is not impacted by extreme scores in the distribution. The mean, however, is calculated by averaging all the scores in the distribution, so extreme scores (either low or high) will impact the mean's value. Therefore, the median is superior because it is insensitive to outliers occurring when the distribution has a severe skew.

9. A journal reviewer tells you that he cannot accept your manuscript for publication because your operational definition has poor construct validity. Explain what he means by that.

answer

He means that the way you have chosen to measure your construct (i.e., your operational definition) is not really measuring what you think it measures. Therefore, it has poor construct validity. A construct is the thing or entity you wish to measure (e.g., attraction, aggression, pain, depression). If the way you have chosen to measure (i.e. operationally define) your construct (e.g., a scale, observed behavior, physiological responses) is actually measuring something other than your construct, then you have poor construct validity. Convergent and discriminant validation is one method to assess construct validity.