**Please study CH05** to finish this homework assignment, and you can practice the **Chapter Exercise on Page 174-177**. You can find out useful tips from this practice and weekly materials on Blackboard. Also, you have to familiar with the **standard normal table** (Table 5.2 on page 156 & APPENDIX B on page 463-7). These tables are very important to understand transformations between raw scores and standard (Z) scores. Also, you can see the advice for HW3 in “HW3 Questions” Virtual office in “Week 3 (6/7-6/8)” folder under “Class Materials” tab on Blackboard.

Problem set 1: Use the following information to answer questions 1-5 (40 points):

A criminologist developed a test to measure recidivism, where low scores indicated a lower probability of repeating the undesirable behavior. The test is normed so that it has **a mean of 122** and **a standard deviation of 32**.

1. What is the percentile rank of a score of 186 (8 pts)?

1. What is the Z score for a test score of 94 (8 pts)?

1. What percentage of scores falls between 94 and 170 (8 pts)?
2. What **proportion** of respondents should score above 186 (8 pts)?
3. Suppose an individual is in the 75.8th percentile in this test, what is his or her corresponding recidivism score (8 pts)?

Problem set 2: Use the following information to answer questions 6-14 (40 points):

The mean age at marriage for respondents in the 2020 General Social Survey (GSS) is 25.46, with a standard deviation of 7.22.

1. From 2020 GSS, calculate the z-score associated with an observed age at first marriage of 28 *and* provide a substantive interpretation of this quantity (5 pts)?
2. From 2020 GSS, calculate the z-score associated with an observed age at first marriage of 18 *and* provide a substantive interpretation of this quantity (5 pts)?
3. From 2020 GSS, assume that the z-score associated with a particular age at first marriage is 0.52. If the proportion of the area between this particular age at first marriage and the mean is 0.1985, what proportion of respondents experienced their first marriage earlier than this age (5 pts)?
4. From 2020 GSS, calculate the observed age at marriage associated with a z-score of -0.99 (5 pts).

1. From 2020 GSS, suppose that a person experienced their first marriage at age 23. If the area beyond the z-score associated with age 23 is 0.3632, what proportion of respondents experienced their first marriage before age 23 (5 pts)?
2. From 2020 GSS, suppose that a person experienced their first marriage at age 23. If the area beyond the z-score associated with age 23 is 0.3632, what **proportion** of respondents experienced their first marriage after age 23 (5 pts)?
3. From 2020 GSS, suppose that the proportion of area between the mean and two z-score of +0.42 and -0.42 are both 0.1628. **Calculate the raw scores associated with these two z-scores.** What **proportion** of respondents were first married between these two ages (3 pts)?
4. From 2020 GSS, the z-score associated with the top 5 percent of the distribution is approximately 1.65. What is **the observed age** at first marriage associated with this z-score (5 pts)?

1. From 2020 GSS, for a first age at marriage of 37.37, the proportion of area beyond the z-score associated with this age is 0.0495. What is the **percentile rank** for this score (2 pts)?

Problem set 3: use the following table to answer questions 20-23 (20 pts total):

In this table, We report the average years of education for a subsample of GSS 2018 respondents by their social class—lower, working, middle, and upper. Standard deviations are also reported for each class.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Mean | **Standard Deviation** | **N** |
| Lower class | 12.03 | **2.93** | **142** |
| Working class | 13.05 | **2.85** | **541** |
| Middle class | 14.56 | **2.62** | **475** |
| Upper class | 15.48 | **2.33** | **34** |

1. Assuming that years of education is normally distributed in the population, what proportion of working-class respondents have 10 to 15 years of education (4 pts)? What proportion of middle-class respondents have 10 to 15 years of education (4 pts)?
2. What is the probability that a working-class respondent, drawn at random from the population, will have more than 16 years of education (4 pts)? What is the equivalent probability for a lower-class respondent drawn at random (4 pts)?
3. What is the probability that a upper-class respondent will have less than 10 years of education (2 pts)?
4. If years of education is actually positively skewed in the population, how would that change your other answers (2 pts)?