**Homework 6**

**Percentiles and Hypothesis Testing with Z-Tests**

**When submitting this file, be sure the filename includes your full name, course and section. Example: HW6\_JohnDoe\_354B01**

Be sure you have reviewed this module/week’s lesson and presentations along with the practice data analysis before proceeding to the homework exercises. Complete all analyses in SPSS, then copy and paste your output and graphs into your homework document file. Answer any written questions (such as the text-based questions or the APA Participants section) in the appropriate place within the same file.

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|  | **Part I: Concepts****Questions 1–4****These questions are based on the Nolan and Heinzen reading and end-of-chapter questions.** |  |

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|  | **Part I: Questions 1-7****End-of-chapter problems:** * Answer the following questions.
* If applicable, remember to show work in your homework document for partial credit.
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| **1) What are the 6 steps of hypothesis testing?** |
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| **2) Using the z table in Appendix B, calculate the following percentages for a z score of -0.45** |
| **2-a)** **% above this z score:**  | **Work:** |
| **2-b) % below this z score:**  | **Work:** |
| **2-c) At least as extreme as this z score (on either side):** | **Work:** |
| **3) Rewrite each of the following percentages as probabilities, or *p* levels:** |
| **3-a) 5% = Answer** |
| **3-b) 95% = Answer** |
| **3-c) 43% = Answer** |
| **4) If the critical values, or cutoffs, for a two-tailed z test are -2.05 and +2.05, determine whether you would reject or fail to reject the null hypothesis in each of the following cases:**  |
| **4a) z = 2.23 Answer** |
| **4b) z = -0.97 Answer** |
| **5)** | **Imagine a class of twenty-five 12-year-old girls with an average height of 62 inches. We know that the population mean and standard deviation for this age group of girls is m=59 inches, s = 1.5 inches. (Note that this is a z *statistic* problem.)** |
| **5a) Calculate the z statistic for this sample (not the z score). Work:** |
| **5b) How does this sample mean compare to the distribution of sample means? In other words, how does the height of the girls in the sample compare to the height of girls in th general population? Answer** |
| **6)** | **For the following scenarios, identify whether the researcher has expressed a directional or a nondirectional hypothesis:** |
| **6a) Social media has changed the levels of closeness in long-distance relationships.** **Answer** |
| **6b) A professor wonders whether students who eat a healthy breakfast score better on exams in morning courses than those who do not eat a healthy breakfast.** **Answer** |
| **7)** | **For the following scenario, state the null and research hypotheses in both words and symbolic notation. Symbolic notation must include the symbols “” and “” and a comparison operator (=,** $\ne $**, <, >,** $\leq $**,** $\geq $**), as described in Nolan and Heinzen (2014). Remember to consider whether the hypothesis is nondirectional or directional.****Scenario: A professor wonders whether students who eat a healthy breakfast score better on exams in morning courses than those who do not eat a healthy breakfast.** |
| Null Hypothesis (H0): Symbolic Notation | **Answer** |
| Null Hypothesis: Written Statement | **Answer** |
| Research Hypothesis (H1): Symbolic Notation | **Answer** |
| Research Hypothesis: Written Statement | **Answer** |

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|  | **Part I: Questions 8a-8g****Fill in the highlighted blanks with the best word or words.** |
| **8-a)** | Values of a test statistic beyond which you reject the null hypothesis are called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**. |
| **8-b)** | The **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is the area in the tails in which the null can be rejected. |
| **8-c)** | The probability used to determine the critical values, or cutoffs, in hypothesis testing is known as a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** level, also known as alpha.  |
| **8-d)** | If your data differ from what you would expect if chance were the only thing operating, you would call your finding **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **8-e)** | A hypothesis test in which the research hypothesis is directional is a(n) **\_\_\_\_\_\_\_\_** test. |
| **8-f)** | A hypothesis test in which the research hypothesis specifies that there will be a difference but does not specify the direction of that difference is a(n) **\_\_\_\_\_\_\_\_\_\_\_\_\_** test. |
| **8-g)** | If your z-statistic exceeds the critical cutoff, you can **\_\_\_\_\_\_\_\_\_\_** the null hypothesis. |

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|  | **Part I: Questions 10a-10c** The police department of a major city has found that the average height of their 1,200 officers is 71 inches (in.) with  = 2.6 inches. Use the normal distribution and the formulas and steps in this week’s presentations to answer the following questions:**Note: Showing work is required for this section.** Remember that it helps to transfer the raw mean and SD from the description above to the standardized curve shown here (though you don’t need to show this). This helps compare raw and z scores and check your work. |
| **10a)** | ***What is the z score* for an officer who is 72 inches tall? Based on the z score and the z table, what is the officer’s *percentile*? *(Hint: See slide 7 of this week’s related presentation)***  |
| **Answer (z score):** | **Work (required):**  |
| **Answer (percentile):** | **Work/reasoning using z table (required):** |
| **10b)** | **What is the *height* (in inches) that marks the 80th percentile for this group of officers? *(Hint: See slides 14-16 of this week’s related presentation)***  |
| **Answer** | **Work (required):** |
| **10c)** | **What *percent* of officers are between 68 and 72 inches tall? *(Hint: See slide 12 of this week’s related presentation)*** |
| **Answer** | **Work (required):** |

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|  | **Part I: Questions 11a-11c** The verbal part of the Graduate Record Exam (GRE) has a  of 500 and  = 100. Use the normal distribution and the formulas and steps in this week’s presentations to answer the following questions:**Note: Showing work is required for this section.** Remember that it helps to transfer the raw mean and SD from the description above to the standardized curve shown here (though you don’t need to show this). This helps compare raw and z scores and check your work.  |
| **11a)** | **What is the *z score* for a GRE score of 583?****What is the *percentile rank* of this z score? *(Hint: See slide 7 of this week’s related presentation)***  |
| **Answer (z score):** | **Work (required):** |
| **Answer (percentile):** | **Work (required):** |
| **11b)** | **What *GRE score* corresponds to a percentile rank of 25%? *(Hint: See slide 17 of this week’s related presentation)***  |
| **Answer** | **Work (required):** |
| **11c)** |  **If you wanted to select only students at or above the 82nd percentile, what *GRE score* would you use as a cutoff score (i.e. what GRE score corresponds to this percentile)? *(Hint: See slides 14-16 of this week’s related presentation)***  |
| **Answer** | **Work (required):** |

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|  | **Part II: SPSS Analysis****For this section, you will be using last module/week’s data set containing IQ scores.** **Open the file; it should also contain the standardized IQ variable you created last module/week.**  |  |

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|  | **Part II: Question 1a & 1b**Use last week’s HW file that you created using IQ scores, and the SPSS reading and presentation from this week. * **Using the z-scored IQ variable, create percentile ranks assuming the scores are normally distributed.**
	+ **Call the new percentile variable “IQ rank.”**
 |
| **1a)** |  **List the first 5 IQ *ranks* from your file (rows 1–5).** |
| **Answer:****Row 1:** **Row 2:** **Row 3:** **Row 4:** **Row 5:**  |
| **1b)** | **Which *raw* IQ score seems to best divide the top 50% from the bottom 50% of scores?** (*This score can be found by looking carefully over the values in the IQ rank column*)  |
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|  | **Part III: SPSS Data Entry and Analysis****There is no Part III material this module/week.** |  |

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|  | **Part IV: Cumulative****Data provided below for respective questions.** |  |

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|  | **Part IV:** (Non-SPSS)**Questions 1-4****For a distribution with *M* = 40 and *s* = 5:** |
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| **1)** | **What is the z-score corresponding to a raw score of 32?**  |
| **Answer** | **Work:** |
| **2)**  | **What is the z-score corresponding to a raw score of 50?** |
| **Answer** | **Work:** |
| **3)** | **If a person has a z-score of 1.8, what is his/her raw score?**  |
| **Answer** | **Work:** |
| **4)** | **If a person has a z-score of -.63, what is his/her raw score?**  |
| **Answer** | **Work:** |

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|  | **Part IV:** (Non-SPSS)**Question 5-8****For the following types of data, state the graph that would be the best choice to display the data.** **Two items have more than one correct answer—for these, either answer is acceptable.** |
| **5)**  | **A nominal independent variable (IV) and a scale dependent variable (DV)**  |
| **Answer** |
| **6)**  | **One scale variable with frequencies (when you want to see the general shape of the distribution).** |
| **Answer** |
| **7)**  | **One scale IV and one scale DV**  |
| **Answer** |
| **8)**  | **One nominal variable broken down into percentages** |
| **Answer** |

Submit Homework 6 by 11:59 p.m. (ET) on Monday of Module/Week 6. Remember to name file appropriately.

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|  | **Done!** |  |