RA #10: Comprehensive

1. Number of courses taken by a small group of students are displayed below:
3, 4, 5, 6, 3, 4, 5, 6, 3, 3
Find mean and variance of the number of courses.
Mean = 4.2 var = 1.51

2. Mean and std dev of SAT scores of a large group of students are mean =μ =1500, Std Dev = σ = 150, distribution of scores is approximately bell-shaped symmetric. Find the 84th percentile SAT score.
1648.5

3. A parallel system functions whenever at least one of its components works. Consider a system of 4 components and suppose that each component independently works with probability 0.90. Find the probability that the system functions.
.9999

4. Let A and B be two subsets of the sample space of an experiment. If P(A) = 0.35, P(B) = 0.55, and P(A ∩ B) = 0.15, find p(A ∩ Bc).
.2

5. A lot consisting of 50 bulbs is inspected by taking at random 10 bulbs and testing them. If the number of defective bulbs out of 10 is 0, then lot is accepted; otherwise it is rejected. If there are 2 defective bulbs in the lot, what is the probability of accepting the lot?
.64

6. The probability that a person responds to a mailed questionnaire is 0.3. What is the probability that of 20 questionnaires, fewer than four will be responded?
.072

7. For standadrd normal random variable Z, find
(i) p(-1.04 < Z < 1.45)
.7773

(ii) p(1.0 < Z < 3.45)
.841

8. For standadrd normal random variable Z, given p(Z < z0) = 0.33, find z0-score.
-.44

9. Scores (x) on a college entrance examination are normally distributed with μ=560 and σ=110.
(i) What proportion of scores are less than 585?
.5871

(ii) University U will consider for admission only those applicants whose scores exceed the 83rd percentile of the distribution. Find the minimum score an applicant must achieve in order to receive consideration for admission.
664.5

10. Weights of 10-ounce bag corn chips follow a normal distribution with μ=10 and σ=0.4 ounces. Find the probability that the sample mean weight of 36 randomly selected bags is less than 10.20 ounces.
.9987

11. A new type of band has been developed by a dental laboratory for children who have to wear braces. The new bands are designed to look better, be more comfortable, and provide more rapid progress in realigning teeth. An experiment was conducted to compare the mean wearing time necessary to correct a specific type of misalignment between the old braces and the new bands. Seventy two children were randomly assigned, 36 to each group. A summary of the data is given below.

Old Braces: n1= 36, sample mean = 420, s1 = 48 days;
New Bands: n2= 36, sample mean = 395, s2 = 50 days;
Conduct a test to see if the population mean wearing times differ using α= 0.05.
Null Hypothesis: mu1 = mu2
Alternate Hypothesis: mu1 =/= mu2

12. A random sample of 10 U.S adult males who jog at least 15 miles per week had the following pulse rates per minutes. Find a 95% confidence interval for the mean pulse rate of all U.S. adult males who jog at least 15 miles per week. Assume normal distribution for pulse rates.
54.8 50.5 50.8 53.4 53.5, 53, 54.5, 52, 53.5, 55

13. Suppose that in a random sample of 200 adults, 75 were victims of a crime. Estimate the true proportion of adults who were victims of a crime using a 99% confidence interval.
(0.2868, 0.4632)

14. How many students should be sampled if you want to estimate the true mean number of credit hours per student with an error of no more than 0.7 with 95% confidence. From a prior study, it is known that the standard deviation is 1.5.
18