Probability Assignment

1. Two dies are rolled at once. Find out the probability for sum of numbers being even and one of the die shows 6.

2. Two dies are rolled at once. Find out the probability for sum of numbers being less than 7

3. You toss a fair coin three times: Given that you have observed *at least* one heads, what is the probability that you observe at least two heads?

4. In my town, it's rainy one third of the days. Given that it is rainy, there will be heavy traffic with probability 1/2, and given that it is not rainy, there will be heavy traffic with probability 1/4. If it's rainy and there is heavy traffic, I arrive late for work with probability 1/2. On the other hand, the probability of being late is 1/8 if it is not rainy and there is no heavy traffic. In other situations (rainy and no traffic, not rainy and traffic) the probability of being late is 0.25, 0.25. You pick a random day.What is the probability that it's not raining and there is heavy traffic and I am not late?

(a) What is the probability that it's not raining and there is heavy traffic and I am not late?

(b) What is the probability that I am late?

(c) Given that I arrived late at work, what is the probability that it rained that day?

5. A box contains three coins: two regular coins and one fake two-headed coin (P(Heads)=1), you pick a coin at random and toss it.

(a) What is the probability that it lands heads up?

(b) You pick a coin at random and toss it and get heads. What is the probability that it is the two-headed coin?

6. Suppose that, of all the customers at a coffee shop,

(a) 70% purchase a cup of coffee

(b) 40% purchase a piece of cake

6.3. 20% purchase both a cup of coffee and a piece of cake.

Given that a randomly chosen customer has purchased a piece of cake, what is the probability that he/she has also purchased a cup of coffee?

7. A population has a mean of 50 and a standard deviation of 6.

(a) What are the mean and standard deviation of the sampling distribution of the mean for N = 16 ?

(b) What are the mean and standard deviation of the sampling distribution of the mean for N = 20?

8. Given a test that is normally distributed with a mean of 100 and a standard deviation of 12, find:

(a) The probability that a single score drawn at random will be greater than 110

(b) The probability that a sample of 25 scores will have a mean greater than 105

(c) The probability that a sample of 64 scores will have a mean greater than 105

(d) The probability that the mean of a sample of 16 scores will be either less than 95 or greater than 105

9. In the population, the mean SAT score is 1000. Would you be more likely (or equally likely) to get a sample mean of 1200 if you randomly sampled 10 students or if you randomly sampled 30 students? Explain. Write a python code and try.

10. A population is known to be normally distributed with a standard deviation of 2.8.

(a) Compute the 95% confidence interval on the mean based on the following sample of nine: 8, 9, 10, 13, 14, 16, 17, 20, 21.

(b) Now compute the 99% confidence interval using the same data

11. A is known to tell the truth in 5 cases out of 6 and he states that a white ball was drawn from a bag containing 8 blacks and 1 white ball. Find the probability that the white ball was drawn.

12. A speaks the truth 4 out of 5 times. A die is tossed. A reports that it is a 6. What are the chances that there actually was a 6?