Due date : July 28, 2016

- 1) Suppose you have 10 marbles. They are marked with the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10. They are placed in a jar, and you reach in and select one. What is the probability that the number you select has a factor of 3? What is the probability that the number you select is a prime number? What is the probability that the number you select is even? What is the probability that the number you select is even? What is the probability that the number you select is even?
- 2) If a fair coin is tossed *n* times (for sufficiently large *n*), the probability of the number of heads lying between $\frac{n}{2} \sqrt{\frac{n}{4}}$ and $\frac{n}{2} + \sqrt{\frac{n}{4}}$ is 68.27%, between $\frac{n}{2} 2 \cdot \sqrt{\frac{n}{4}}$ and $\frac{n}{2} + 2 \cdot \sqrt{\frac{n}{4}}$ is 95.45%, between $\frac{n}{2} 3 \cdot \sqrt{\frac{n}{4}}$ and $\frac{n}{2} + 3 \cdot \sqrt{\frac{n}{4}}$ is 99.73% We take a coin and flip it 10000 times. We notice that there are 4850 heads in the sequence. What do you suspect about the coin? Explain your reasoning.
- 3) You roll two fair dice. What is the probability that you will roll a double (two 1's, two 2's, and so on)?
- 4) It is told to you that meteor showers are random events that have no preference for any part of the night (equally likely to happen at any time). You have deciphered that the probability of seeing a meteor shower in any given span of 1 hour is $\frac{84}{100}$. What is the probability of seeing a meteor shower in any given span of 2 hours? in any given span of 30 min?
- 5) Suppose there are two full bowls of cookies. Bowl #1 has 10 chocolate chip and 30 plain cookies, while bowl #2 has 20 of each. You pick a bowl at random, and then pick a cookie at random. The cookie turns out to be a plain one. How probable is it that you picked it out of Bowl #1?