MATH 21-01 (Introductory Statistics), HW5 (100 points). Due: 03/08/2017 in class.

Not from textbook

Suppose a game is played where a standard 6 sided die is tossed and then a coin is flipped. Suppose a head flip is counted as a 1 and a tail is counted as a -1. Let the score in any instance of such a game be defined as the sum of the die number which comes up and of the coin flip. Suppose X is a random variable which records the score in such a game. Please supply the R code for part E below.

- (A) What values can X take?
- (B) What is a PDF (probability density function)? Calculate the probability distribution of X.
- (C) What is a CDF (cumulative distribution function)? Plot the CDF of X.
- (D) Calculate $E[X]$ and σ_X^2.
- (E) Summarize the Law of Large Numbers. Write a program in R to simulate this game. Plot (a labeled) histogram of the scores using 10, 200, and 15000 trials. Compute the sample means of the scores for these numbers of trials and compare to $E[X]$.

The following questions involve the Binomial distribution. You may use R as a calculator to evaluate the expression for the probability. See the help pages on the dbinom and pbinom functions.

- (F) What is the probability of getting 4 threes, when a die is rolled 10 times?
- (G) A cheap resistor maker produces resistors which are 99.7% likely to not deviate by more than 2% from their marked ohm specifications. If a company buys 500 such resistors, calculate the probability that the sample will contain no resistors which deviate more than the indicated amount from their specifications.
- (H) Find the probability that in five rolls of 2 dice, at least one sum total of 7 occurs.
- (I) Suppose there are 10 questions on an exam. Each question has 4 multiple choice answers, with one being correct. Find the probability of having 3 or less correct answers, if all questions are answered at random.