W12 Homework A

Due date: Thursday 4/2, 11:59pm

01

Summation of three: Rolling mixed dice

You have three dice. One has 4, one has 6, and one has 12 sides.

How many 4s do you expect to see if you roll these dice together?

02

Jumble of coins

In my pocket I have a jumble of coins: 5 dimes, 4 quarters, 3 nickels, 3 pennies, and one big 50¢-piece. I draw three at random. What is the expected value of the three?

03

Burning through light bulbs

A 100 Watt light bulb's expected lifetime is 600 hours, with variance 360,000. An advertising board uses one of these light bulbs at a time, and when one burns out, it is immediately replaced with another. (The lifetime of each bulb is independent from the others.) Let the continuous random variable W be the total number of hours of advertising from 10 bulbs.

(a) Find the expected value of W.

(b) Find the variance of W.

(c) Use the CLT to approximate the probability that W is less than 5,500 hours. (You should decide whether it is appropriate to use the continuity correction.)

04

Normal approximation - Eating hot dogs

Frank is a competitive hot dog eater. He eats $1\,\text{hd}$ in $15\,\text{sec}$ with $\sigma = 4\,\text{sec}$.

What is the probability that Frank manages to consume $64\,\text{hd}$ in $15\,\text{min}$ or less, in an upcoming competition? Use a normal approximation from the CLT to estimate this probability.

State the reason that the normal approximation is applicable.

05

Normal approximation - Grading many exams

An instructor has 50 exams to grade. The grading time for each exam follows a distribution with an average of 20 minutes and variance of 16. Assume the grading times per exam are independent.

Roughly what are the odds that after 450 minutes of grading, at least half the exams will be graded? Use a normal approximation to estimate the answer.

State the reason that the normal approximation is applicable.