Homework #3

*Submit your homework to your support TA’s before the due date/time. The mailboxes are to the left as you enter the Medical Science Center (1300 University Ave.) from the main University Ave. entrance.

*No late homework will be accepted for credit!

*If a problem asks you to use R, include a copy of the code and output. Please edit your code and output to be only the relevant portions.

*If a problem does not specify how to compute the answer, you may use any appropriate method.

1. To celebrate their 30th birthdays, brothers Mario and Luigi of the Nintendo Mario video game franchise wish to study the distribution of heights of their mushroom enemies, the Goombas. Their reasoning is that shorter Goombas are easier to jump on. (Goombas die when Mario and Luigi jump on them.)

(a) If we assume that the population of Goomba heights are normally distributed with mean 12 inches and standard deviation 6 inches, what is the probability that a randomly chosen goomba has a height between 13 and 15 inches?

(b) Koopa Troopas, other enemies of Mario & Luigi, have a mean height of 15 inches with standard deviation 3 inches. What is the probability that a randomly chosen Koopa Troopa is taller than 75% of Goombas?

2. Let $F$ be an RV that represents the operating temperature in Fahrenheit of one instance of a manufacturing process, and let $F \sim N(90, 5^2)$. Let $C$ be an RV that represents the same process, but measured in Celsius. Fahrenheit can be converted to Celsius using $C = \frac{5}{9}(F - 32)$. (I recommend doing these with a calculator and $N(0,1)$ table as practice for the exam. Then check your answers with R if you wish.)

(a) Find the probability that one randomly selected instance of the process will have operating temperature greater than 93.8 Fahrenheit.

(b) $C$ is also normally distributed. Find its mean and variance.

(c) Find the probability that one randomly selected instance of the process will have operating temperature below 29 Celsius.

(d) Find the Celsius temperature $x$ such that the probability that the operating temperature in Celsius of one instance is less than $x$ is .25.

R Notes

- None for this homework.