

Continuous Distributions.

1. A bus leaves the station at times divisible by 10 min. Alice arrives to the station at time having uniform distribution on $[0,10]$ min. What is the mean value and the variance of her waiting time? What is the chance she will have to wait between 2 and 5 min?
2. A temperature measurement at a weather station has error which is normally distributed with mean zero and standard deviation 3. If the measurement is 81 degrees what is the probability that the actual temperature is less than 80 degrees?
3. Isabel and John know 75 % of the material each. To get C John needs to solve 70 % of all test problems. Which grading system is better for him one with 30 questions or with 50 questions? Answer the same question for Isabel who wants to get B and needs to solve 80 % of the problems.
4. During 2006 Italian election Romano Prodi won over incumbent Silvio Berlusconi by about 25,000 votes. Berlusconi contested the results claiming that this margin could be due to voting mistakes. How credible is his claim? (Italy has about 40,000,000 voters. Assume that electoral mistakes in favor of the ruling party are at least as like as mistakes in favor of the opposition).
5. The probability to win in a lottery is $1/1000$. John plays 50 times a year. What is the probability his first win will be between his 20th and 30th years of play?
6. Let X and Y be independent, $X \sim \text{Exp}(1)$, $Y \sim \text{Exp}(2)$. Find the distribution of
 - (a) $X/2$
 - (b) $\min(X, Y)$
 - (c) Find the probability what $X > Y$.