

Choose the correct distribution for each of the following.

1. Cars are known to pass by a spot on a lonely road with an average of 23 minutes between vehicles. If a car has just passed by, what is the probability that the next car will pass by within 15 minutes?
2. Suppose a batch of 1000 electronic parts has 10 defective parts. If you randomly draw three parts from the batch, with replacement, what is the probability that you will get exactly one defective part?
3. It is known that a 3 yard by 100 yard piece of cloth has 17 flaws. If a two yard by five yard piece is cut from the original, what is the probability that it will not have a flaw?
4. When Waterman taught high school he once volunteered to allow students to throw pie tins of shaving cream at his face (with his head sticking through a hole in a board). Whether or not a pie tin hit him was independent of who was throwing and how many times they had thrown, with a probability of 0.08 that he would be hit. What is the probability that he was first hit on the 12th attempt?
5. Some alarms are designed to emit a pitch of 2300 Hz, and the average pitch for all of them is found to be 2304 Hz, with a standard deviation of $\sigma = 37$ Hz. What is the probability that a randomly selected alarm emits a pitch that is between 2250 to 2350 Hz?
6. Lengths of screws are normally distributed, with mean 2.31 cm and standard deviation 0.03 cm. Find the probability that 8 or more out of 10 randomly selected screws are less than 2.35 cm long.
7. You know from past experience that your probability of winning a particular video game is 0.35. You should work on some homework, but before doing that you allow yourself to play the game until you have won twice. What is the probability that you will play at least three times before you quit to study? **Assume that the likelihood of winning each time you play is independent of your success previous times that you have played the game.**
8. Waterman loses gloves at the rate of about 3 pairs every five years. What is the probability that he will lose two pair in the next year and a half?
9. A large bag of candies contains 47 caramels, 61 milk chocolates and 54 dark chocolates. Waterman has a bit of a taste for this sort of thing, and he randomly selects and eats 13 candies from the bag (over the course of a half hour or so). His favorites are the dark chocolates; what is the probability that *at least* 5 of the candies he ate were dark chocolates?
10. The average lifetime of a particular component in a device is 4300 hours of operation. What is the probability of failure of such a device in 4300 hours or less? (Your intuition might tell you that the answer is 0.5, but it is not!)

Select the letter of the correct distribution for each of the exercises from the front side. **For any that use more than one distribution, select the distribution used to obtain the final answer.**

1. A. hypergeometric B. binomial C. negative binomial D. Poisson E. exponential
2. A. hypergeometric B. binomial C. negative binomial D. Poisson E. exponential
3. A. hypergeometric B. binomial C. negative binomial D. exponential E. Poisson
4. A. normal B. exponential C. Poisson D. negative binomial E. binomial
5. A. normal B. exponential C. Poisson D. negative binomial E. binomial
6. A. normal B. exponential C. Poisson D. negative binomial E. binomial
7. A. binomial B. negative binomial C. hypergeometric D. Poisson E. gamma
8. A. gamma B. exponential C. binomial D. negative binomial E. hypergeometric
9. A. binomial B. negative binomial C. hypergeometric D. Poisson E. gamma
10. A. gamma B. binomial C. Poisson D. exponential E. normal

Math 465

ASSIGNMENT 5, WINTER 2017

Due at the start of class on Tues, Feb 21st

In order to earn credit for this assignment you must show work, neatly and correctly. Begin with the given expression and end with the final result, with all steps connected with equal signs in the standard “over and down” arrangement. Show substitutions to the right of the main calculation. Every integral must include a dx .

Integration by Parts Formulas

$$\int u dv = uv - \int v du \qquad \int_a^b u dv = uv \Big|_a^b - \int_a^b v du$$

1. Use integration by parts to evaluate $\int_0^3 x e^{2x} dx$. Give your answer in exact form (so it will include a power of e .)
2. Use integration by parts twice to find $\int x^2 e^{-3x} dx$.
3. Use integration by parts to find $\int x \ln x dx$. In this case, let $u = \ln x$.