

MAT 105 - Homework 7
Due Thursday, 3/10/16, in class

1. Suppose that the probability that an item produced by a certain machine will be defective is 0.01. Find the probability that a sample of 100 items will contain at most 1 defective item.
2. We flip 3 fair coins and we call HHH a success.
 - (a) If we play this game 200 times, find the probability of exactly 20 successes.
 - (b) On average, how many times do we need to play until we reach 10 successes?
3. Suppose that the average number of cars abandoned weekly on a certain highway is 2.2. Approximate the probability that there will be no abandoned cars on that highway in the next week.
4. Consider an experiment that consists of counting the number of α -particles given off in a 1-second interval by 1 gram of radioactive material. If we know from past experience that, on average, 3.2 such α -particles are given off, what is a good approximation to the probability that no more than 2 α -particles will appear?
5. Suppose that 10% of Hi-Chews are strawberry flavored.
 - (a) Find the probability that in a bag of 100 Hi-Chews there is only one strawberry flavored.
 - (b) Suppose you pick candy out of the bag (with replacement) until you finally get a strawberry flavored one. On average, how many times do you have to pick?
6. An airline finds that 4% of the passengers that make reservations on a particular flight will not show up. Consequently, their policy is to sell 100 reserved seats on a plane that has only 98 seats. Find the probability that every person who shows up for the flight will find a seat available.
7. A small town has an average of 5 fires per year. What is the probability that there will be more than 3 fires in this town, this year?
8. Let X be a standard normal random variable, that is, $X = N(0, 1)$. Compute
 - (a) $P(X \leq 1.34)$
 - (b) $P(X \geq -2.16)$
 - (c) $P(-2.11 \leq X \leq 0.58)$
 - (d) $P(-2 \leq X \leq -1.23)$
9. Let X be a normal random variable with mean $\mu = 5$ and variance $\sigma^2 = 9$. Compute
 - (a) $P(X \leq 4)$
 - (b) $P(X \geq -1.66)$
 - (c) $P(2 \leq X \leq 8)$

10. Let X be a normal random variable with mean $\mu = 3$ and variance $\sigma^2 = 4$. Compute
- (a) $P(X \leq 4)$
 - (b) $P(X \geq -1.66)$
 - (c) $P(2.54 \leq X \leq 3.52)$
11. The annual rainfall (in inches) in a certain region is normally distributed with $\mu = 30$ and $\sigma = 4$. Find
- (a) the probability it will rain less than 25 inches this year;
 - (b) the probability that starting with this year, it will take over 10 years before a year occurs having a rainfall of over 25 inches.
12. According to a study, brain weights of Swedish men are normally distributed with a mean of 1.40 kg and a standard deviation of 0.11 kg. Find the probability that the brain of a randomly selected Swedish man is between 1.25 and 1.45 kg.
13. For humans, gestation periods are normally distributed with a mean of 266 days and a standard deviation of 16 days. Find the probability that your first child will be born at between 240 and 270 days gestation.
14. From past experience, a professor knows that the test score of a student on the final is a normal random variable with mean 85 and variance 25. What is the probability that a randomly chosen student will score between 75 and 90 on the final?