

Exam III Review Problems

Fall 2009

Note: Not every topic is covered in this review.

Please also take a look at the previous Week-in-Reviews for more practice problems.

1. Determine whether or not the following experiments are binomial.
 - (a) Roll a pair of fair six-sided dice 10 times and observe whether or not a sum of 2 is rolled.
 - (b) Roll a fair six-sided die 8 times and note the number rolled.
 - (c) Toss a fair coin until a head is tossed.
 - (d) Pick 4 marbles, in succession without replacement, from a box with 4 red and 5 green marbles and observe the color of the marble picked.
 - (e) Pick a marble from Box 1 containing 4 red and 5 green marbles and observe the color of the marble picked. Pick a marble from Box 2 containing 3 red and 6 green marbles and observe the color of the marble picked.

2. 15% of a given population is left-handed. A sample of 50 people from the population is selected at random. What is the probability that
 - (a) Exactly 8 people are left-handed?
 - (b) At most 15 people are left-handed?
 - (c) More than 11 people are left-handed?
 - (d) Between 6 and 20 people are left-handed?

3. You roll a weighted six-sided die 500 times. The die is weighted such that the probability of the die showing a 1 is 0.8.

(a) What's the probability that exactly 408 ones are rolled?

(b) What's the probability that at least 375 ones are rolled?

(c) What's the probability that fewer than 390 ones are rolled?

(d) How many ones should you expect to roll?

(e) What is the variance and standard deviation in the number of ones rolled?

4. Calculate the following probabilities:

(a) $P(-2 \leq Z < 0.22)$

(b) $P(Z \leq 1.75)$

(c) $P(Z > -0.35)$

5. Find a such that

(a) $P(Z < a) = 0.8158$

(b) $P(Z > a) = 0.3257$

(c) $P(-a < Z < a) = 0.6102$

6. Suppose weights of bags of snack mix are normally distributed with a mean of 10 ounces and a standard deviation of 0.6 ounces. What is the probability that a bag selected at random weighs

(a) Between 9.5 and 11 ounces?

(b) At least 9 ounces?

(c) Less than 8.5 ounces?

7. A study finds that the lifespan of phone batteries are normally distributed with a mean of 2 years and a standard deviation of 1.5 months.

(a) What is the probability that a phone battery will have a lifespan between 22 and 26 months?

(b) What battery lifespan corresponds to the 95th percentile?

8. A baseball player has a record of hitting a single in 12 out of every 30 at-bats. During last season, this player was at-bat 150 times. Use an appropriate normal distribution to approximate the following binomial probabilities. What's the probability that during last season the player hit

(a) Between 55 and 65 singles, inclusive?

(b) At least 70 singles?

(c) Fewer than 52 singles?

9. A box contains 21 candles: 10 white, 3 red, 6 green, and 2 navy. You lose electricity and randomly select 6 candles from the box to use for light. What's the probability that you select

(a) Exactly 3 white candles?

(b) At least 2 green candles?

(c) Exactly 2 red or exactly 3 green candles?

12. Let E and F be two events with $P(E) = 0.35$, $P(F) = 0.55$, and $P(E \cap F^C) = 0.15$. Answer the following questions.

(a) $P(E \cap F) =$

(b) $P(E|F) =$

(c) $P(E \cup F) =$

(d) Compute the probability of exactly one of these events (E or F) occurring.

(e) Are E and F mutually exclusive? Why or why not?

(f) Are E and F independent? Why or why not?

13. There are 130 boxes of Cheerios in a grocery store. The following table tells you how many boxes had a certain number of Cheerios in them.

# of Cheerios	510	480	467	434	521	555
# of Boxes	23	17	40	30	9	11

- (a) Place an X in the row of the table which represents the variable being measured.
- (b) Find the mean, median, mode, standard deviation, and variance for X .
- (c) Find the probability distribution of X .
14. Suppose you pay \$10 to roll two fair six-sided dice and sum the numbers that show. You win twice what you paid if a 7 or 11 shows up. You lose what you paid if a 2,3, or 12 shows up. For anything else that shows up, you win \$5. Let X be your net winnings.
- (a) What are your expected net winnings?
- (b) How much should be charged to make this a fair game?

