

Name:

Class Number:

## Math 54 Exam 2

### Fall 2017

Problem 1 \_\_\_\_\_ Problem 11 \_\_\_\_\_

Problem 2 \_\_\_\_\_ Problem 12 \_\_\_\_\_

Problem 3 \_\_\_\_\_ Problem 13 \_\_\_\_\_

Problem 4 \_\_\_\_\_ Problem 14 \_\_\_\_\_

Problem 5 \_\_\_\_\_ Problem 15 \_\_\_\_\_

Problem 6 \_\_\_\_\_ Problem 16 \_\_\_\_\_

Problem 7 \_\_\_\_\_ Problem 17 \_\_\_\_\_

Problem 8 \_\_\_\_\_ Problem 18 \_\_\_\_\_

Problem 9 \_\_\_\_\_ Problem 19 \_\_\_\_\_

Problem 10 \_\_\_\_\_ Problem 20 \_\_\_\_\_

**Problem 1.** Can  $-0.5$  be a probability? Yes or No.

**Problem 2.** Suppose we flip a coin 5 times where the probability of heads on a flip is  $0.6$ . Find the probability we get 5 heads. Write your answer using 3 decimal places.

**Problem 3.** A certain probability distribution is as follows (the possible values of the random variable  $x$  and the associated probabilities are given):  $x = -4.1$  with probability  $1/10$ ,  $x = 1.8$  with probability  $1/2$ ,  $x = 2.2$  with probability  $2/5$ . Compute the mean of the probability distribution. Write your answer using 2 decimal places.

**Problem 4.** A certain probability distribution is as follows (the possible values of the random variable  $x$  and the associated probabilities are given):  $x = -2.2$  with probability  $1/10$ ,  $x = 1.4$  with probability  $1/2$ ,  $x = 2.7$  with probability  $2/5$ . Compute the variance of the probability distribution. Write your answer using 2 decimal places.

**Problem 5.** Suppose a student guesses on a true/false test that has 8 questions. If it is required to get at least 5 answers right to pass the test, find the probability that the student passes. Write your answer using 2 decimal places.

**Problem 6.** A certain binomial distribution has a probability of success of  $p = 1/7$ . Out of 60 trials find the expected number of successes. Write your answer using 2 decimal places.

**Problem 7.** A certain binomial distribution has a probability of success of  $p = 1/8$ . Out of 70 trials find the standard deviation of the number of successes. Write your answer using 2 decimal places.

**Problem 8.** A box contains 9 red, 5 blue and 1 green marbles. Suppose Bob plays a betting game. He pays \$2 to play. He picks one marble at random. If he picks the red marble he receives \$1, if he picks the blue marble he receives \$3 and if he picks the green marble he receives \$5. Let the random variable  $x$  denote his winnings (i.e., his profit after subtracting off the \$2 he paid to play). Find the expected value of  $x$ , that is, find Bob's expected profit from playing the game. Write your answer using 2 decimal places.

**Problem 9.** A certain binomial distribution has a probability of success of  $p = 0.2$  and  $n = 100$ . What is the minimum number of successes we can observe?

**Problem 10.** We are testing a coin to see if it is fair, i.e., the probability of heads = 0.5. Suppose we flip the coin 800 times and count the number of heads. What is the minimum number of heads we can observe and still declare it is not unusual to have that number of heads for a fair coin?

**Problem 11.** We are testing a coin to see if it is fair, i.e., the probability of heads = 0.5. Suppose we flip the coin 700 times and count the number of heads. What is the maximum number of heads we can observe and still declare it is not unusual to have that number of heads for a fair coin?

**Problem 12.** Suppose event  $A$  has probability  $P(A) = 0.40$  and event  $B$  has  $P(B) = 0.40$  and  $P(A \cap B) = 0.10$ . Find  $P(A \cup B)$ .

**Problem 13.** Assume that  $x$  is a random variable which is uniformly distributed in the interval  $(2,8)$ . What is the height of the probability density function?

**Problem 14.** Assume that  $x$  is a random variable which is uniformly distributed in the interval  $(2,8)$ . Find  $P(2.5 < x < 7.5)$

**Problem 15.** Assume that  $z$  is a random variable which is normally distributed with mean 0 and standard deviation 1 (standard normal). Find  $P(z < 1.60)$ . Write your answer using 4 decimal places.

**Problem 16.** Assume that  $z$  is a random variable which is normally distributed with mean 0 and standard deviation 1 (standard normal). Find  $P(0.42 < z < 1.53)$ . Write your answer using 4 decimal places.

**Problem 17.** Assume that  $z$  is a random variable which is normally distributed with mean 0 and standard deviation 1 (standard normal). Find  $P(z > -1.82)$ . Write your answer using 4 decimal places.

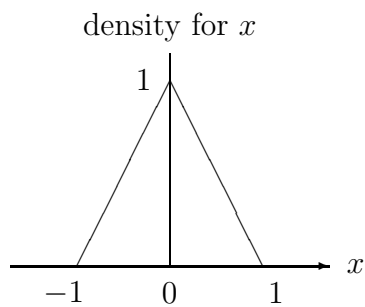
**Problem 18.** Assume that  $z$  is a random variable which is normally distributed with mean 0 and standard deviation 1 (standard normal). Find  $P(-2.12 < z < 2.34)$ . Write your answer using 4 decimal places.

**Problem 19.** Consider the following set of data:

10, 3, 4, 12, 16, 32, 9, 11

Suppose you pick a number at random from this data set. Call this number  $x$ . Find  $P(x < 15)$

**Problem 20.** The density function for a certain random variable  $x$  is shown below. Find  $P(-1/6 < x < 1/6)$ .







**Extra workspace.** If you use this space and want it graded then reference it from the Problem being worked.