Homework 17 Chapters 28 nd 29 (Problems 1 to 6)

Due on December 8

Math 125 *Kovitz* Fall 2025

Problems 3 and 4 are subtle. For parts 3 (a) and (b), refer to pages 480–481. For part 3 (c), which is tricky, refer to pages 552–554. For 4 (a), see pages 552–553. For 4 (b), see page 545.

1. A gambler is accused of using a loaded die, but he pleads innocent. A record has been kept of the last 60 throws. There is disagreement about how to interpret the data and a statistician is called in.

   The observed frequencies for the six numbers on the die are summarized in this table.

Value	*Observed frequency*
1	7
2	11
3	9
4	10
5	16
6	7

   Make a χ^2-test of the null hypothesis that the die is fair.

2. Two people are trying to decide whether a die is fair. They roll it 100 times, with the results shown. One person wants to make a z-test, the other wants to make a χ^2-test. Who is right? Explain briefly, and make the test.

   21 ones, 15 twos, 13 threes, 17 fours, 19 fives, 15 sixes

   Average of numbers rolled ≈ 3.43, SD ≈ 1.76

3. True or false, and explain:

   (a) The P-value of a test is the chance that the null hypothesis is true.

   (b) If a result is statistically significant, there are only 5 chances in 100 for it to be due to chance, and 95 chances in 100 for it to be real.

   (c) Big samples are bad because small diferences will look significant.

4. True or false, and explain briefly.

   (a) A statistically significant difference is big and important.

   (b) A P-value of 4.7% means something quite different from a P-value of 5.2%.

5. Which of the following questions does a test of significance deal with?

   (i) Is the difference due to chance?

   (ii) Is the difference important?

   (iii) What does the difference prove?

   (iv) Was the experiment properly designed?

   Explain briefly.

6. In employment discrimination cases, courts have held that there is proof of discrimination when the percentage of blacks among a firm's employees is lower than the percentage of blacks in the surrounding geographical region, provided the difference is "statistically significant" by the z-test. Suppose that in one city, 10% of the people are black. Suppose too that every firm in the city hires employees by a process which, as far as race is concerned, is equivalent to simple random sampling. Would any of these firms ever be found guilty of discrimination by the z-test? Explain briefly.

   See Example 1 on page 547 for some insight.