

1. Bag 1 contains 5 red balls and 3 black balls. Bag 2 contains 3 red balls and 1 black ball. Bag 3 contains 4 red balls and 2 black balls.
- (a) You draw two balls out of Bag 1, without replacement. Find the probability that both balls are red.
- (b) You pick a bag at random and then draw a ball from it. Find the probability that the ball is red.
2. The Gift Basket Store had the following premade gift baskets containing the following combinations in stock.

	Cookies	Mugs	Candy
Coffee	332	318	29
Tea	1360	104	35

Choose one basket at random. Find the probability that it contains

- (a) Tea
- (b) Coffee or candy
- (c) Tea, given that it contains mugs
- (d) Are the events Coffee and Tea mutually exclusive?  
Explain your answer.
- (e) Are the events Tea and Mugs independent?  
Explain your answer.
3. A jazz band has prepared 16 selections for a concert tour. At each stop they will perform 8.
- (a) How many different programs are possible?
- (b) How many programs are possible if they always begin with the same song and end with the same song?
4. Two manufacturers supply blankets to emergency relief organizations. Manufacturer A supplies 3000 blankets, and 4% are irregular in workmanship. Manufacturer B supplies 2400 blankets, and 7% are found to be irregular. Given that a blanket is irregular, find the probability that it came from manufacturer B.
5. Assume that 55% of all male Canadians are following the hockey playoffs. For a random sample of 6 male Canadians, find each of the following. Do not use any approximation technique.
- (a) The probability that at least two are following the playoffs.
- (b) The mean and standard deviation of male Canadians following the playoffs among samples of six.

6. The number of students using the Math Lab per day is found in the distribution below.

$x$	$P(x)$
6	0.15
8	0.30
10	0.35
12	0.10
14	0.10

- (a) Compute the expected value of the  $x$  distribution.
- (b) Compute the standard deviation of the  $x$  distribution.

7. One report states that children between the ages of 2 and 5 watch an average of 25 hours of television a week. Assume the variable is normally distributed and the standard deviation is 3 hours.
- If one child between the age of 2 and 5 is randomly selected from the general population, find the probability that he or she watches more than 26 hours of television per week.
  - If 20 children between the ages of 2 and 5 are randomly selected, find the probability that on average they watch more than 26 hours of television per week.
8. Two out of five adult smokers acquired the habit by age fourteen. 400 smokers are randomly selected. Use the Normal distribution with continuity correction to estimate the probability that 170 or fewer acquired the habit by age fourteen.
9. A sample of six recent years had an average of 573.8 workplace homicides per year with a standard deviation of 46.8. Find a 99% confidence interval for the population mean of all workplace homicides per year.
10. One poll of 763 randomly selected U.S. adults showed that 329 said they would travel to outer space in their lifetime, given the chance. Find a 95% confidence interval for the proportion of all U.S. adults who would like to travel to outer space.
11. A health care professional wishes to estimate the birth weights of infants. The population standard deviation is assumed to be  $\sigma = 225$  grams. How large a sample must be obtained to be 90% confident that the sample mean  $\bar{x}$  is within 100 grams of the population mean birth weight  $\mu$  for all infants?
12. A researcher claims that the average wind speed in a certain city is different from 8 miles per hour. A sample of 32 days has an average wind speed of 8.2 miles per hour. The standard deviation of the population is 0.6 miles per hour. Test the researcher's claim. Use a 1% significance level.
- State the null and alternate hypotheses.
  - What is the value of the sample test statistic?
  - Find (or estimate) the  $P$ -value.
  - Based on your answers for parts (a) through (c), will you reject or fail to reject the null hypothesis?
13. During a recent year the average cost of making a movie was \$54.8 million. This year, a random sample of 15 recent action movies had an average production cost of \$62.3 million with a standard deviation of \$9.5 million. Use a 5% level of significance to test the claim that it costs more than average to produce an action movie.
- State the null and alternate hypotheses.
  - What is the value of the sample test statistic?
  - Find (or estimate) the  $P$ -value.
  - Based on your answers for parts (a) through (c), will you reject or fail to reject the null hypothesis?
14. An attorney claims that more than 25% of all lawyers advertise. A sample of 200 lawyers in a certain city showed that 62 had used some form of advertising. Use a 5% significance level to test the attorney's claim.
- State the null and alternate hypotheses.
  - What is the value of the sample test statistic?
  - Find (or estimate) the  $P$ -value.
  - Based on your answers for parts (a) through (c), will you reject or fail to reject the null hypothesis?
15. The mean age of a sample of 25 people who were playing slot machines is 48.7 years, and the standard deviation is 6.8 years. The mean age of a sample of 35 people who were playing roulette is 55.3 with a standard deviation of 3.2 years.
- Construct a 95% confidence interval for the difference between the mean ages of players of slot machines and players of roulette.
  - Does there appear to be a difference? If so, which group tends to be the older?

16. A psychologist interviewed 100 people from each of four income groups and asked them if they were “very happy.” A total of 144 people responded *yes*, and the number of those for each group is shown below. At  $\alpha = 0.05$ , test the claim that the distribution of those who responded *yes* fits a uniform distribution (one in which each income group has 25% of the positive responses).

Household Income	Less than \$30000	\$30000 to \$74999	\$75000 to \$99999	\$10000 and more	Total
Number who are “very happy”	24	33	38	49	144

- (a) State the null and alternate hypotheses.  
 (b) What is the value of the sample test statistic?  
 (c) Find (or estimate) the  $P$ -value.  
 (d) Based on your answers for parts (a) through (c), will you reject or fail to reject the null hypothesis?
17. A researcher wishes to determine whether there is a relationship between the gender of an individual and the amount of alcohol consumed. A sample of 68 people is selected, and the results are shown below. Test using  $\alpha = 0.10$  to determine if alcohol consumption is independent of gender.

		<i>Alcohol Consumption</i>			<i>Row Totals</i>
		<b>Low</b>	<b>Moderate</b>	<b>High</b>	
<i>Gender</i>	<b>Male</b>	10	9	8	27
	<b>Female</b>	13	16	12	41
<i>Column Totals</i>		23	25	20	68

- (a) State the null and alternate hypotheses.  
 (b) What is the value of the sample test statistic?  
 (c) Find (or estimate) the  $P$ -value.  
 (d) Based on your answers for parts (a) through (c), will you reject or fail to reject the null hypothesis?

**ANSWERS:**

- 1) a) 0.357    b) 0.681
- 2) a) 0.688    b) 0.328    c) 0.246    d) Yes,  $P(\text{coffee and tea}) = 0$     e) No,  $P(\text{tea}) \neq P(\text{tea} | \text{mugs})$
- 3) a) 518,918,400    b) 2,162,160
- 4) 0.583
- 5) a) 0.9308    b)  $\mu = 3.3; \sigma = 1.219$
- 6) a) 9.4    b) 2.289
- 7) a) 0.3707    b) 0.0681
- 8) 0.8577
- 9)  $496.76 < \mu < 650.84$
- 10)  $0.396 < p < 0.466$
- 11) 14
- 12) a)  $H_0: \mu = 8, H_1: \mu \neq 8$     b)  $z = 1.89$     c) 0.0588    d) Fail to Reject  $H_0$
- 13) a)  $H_0: \mu = 54.8, H_1: \mu > 54.8$     b)  $t = 3.058$     c)  $0.0005 < p < 0.005$     d) Reject  $H_0$
- 14) a)  $H_0: p = 0.25, H_1: p > 0.25$     b)  $z = 1.96$     c) 0.025    d) Reject  $H_0$
- 15) a)  $-9.62 < \mu_1 - \mu_2 < -3.58$     b) At the 95% confidence level, we can conclude that the average slots player is younger than the average roulette player.
- 16) a)  $H_0$ : The distributions are the same,  
 $H_1$ : The distributions are different  
 b)  $\chi^2 = 9.055$     c)  $0.025 < p < 0.050$     d) Reject  $H_0$
- 17) a)  $H_0$ : Alcohol consumption is independent of gender,  
 $H_1$ : Alcohol consumption is not independent of gender  
 b)  $\chi^2 = 0.02808$     c)  $0.100 < p < 0.900$     d) Fail to Reject  $H_0$