

MTH 142: Exam 3

1. The library is to be given 5 books as a gift. The books will be selected from a list of 21 titles. If each book selected must have a different title, how many possible selections are there?
 - a. 4.258×10^{17}
 - b. 5.109×10^{19}
 - c. 20,349
 - d. 2,441,880
2. Of the 2,598,960 different five-card poker hands possible from a deck of 52 playing cards, how many would contain 2 black cards and 3 red cards?
 - a. 845,000
 - b. 1,267,500
 - c. 422,500
 - d. 1,690,000
3. There are 9 members on a board of directors. If they must form a subcommittee of 6 members, how many different subcommittees are possible?
 - a. 531,441
 - b. 720
 - c. 60,480
 - d. 84
4. Assume that a researcher randomly selects 14 newborn babies and counts the number of girls selected, X . Use the following probability table to find the following probabilities.

x	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
$P(X = x)$	.00	.001	.006	.022	.061	.122	.183	.183	.171	.134	.088	.022	.006	.001	.0

- (a) Find probability of selecting more than 10 girls.
 - a. 0.061
 - b. 0.903
 - c. 0.212
 - d. 0.029
- (b) Find probability of selecting less than 3 girls.

5. The random variable x represents the number of tests that a patient entering a hospital will have along with the corresponding probabilities. Find the probability that a patient has fewer than two tests.

x	$P(x)$
0	$3/17$
1	$5/17$
2	$4/17$
3	$3/17$
4	$2/17$

- a. $\frac{6}{17}$
b. $\frac{5}{17}$
c. $\frac{8}{17}$
d. $\frac{3}{17}$
6. Assume that a researcher randomly selects 14 newborn babies and counts the number of girls selected, X . Use the probability table from Question 4 to find the probability of selecting fewer than 6 girls.
- a. 0.183
b. 0.817
c. 0.212
d. 0.395
7. Find the mean of the following probability distribution:

x	$P(x)$
2	0.33
3	0.24
4	0.43

- a. 1.60
b. 2.10
c. 2.60
d. 3.10
8. Find the standard deviation of the following probability distribution:

x	$P(x)$
0	0.20
2	0.05
4	0.35
6	0.25
8	0.15

- a. 2.6
b. 4.7
c. 5.4
d. 3.9

9. At a raffle, 10,000 tickets are sold at \$5 each for three prizes valued at \$4,800, \$1,200, and \$400. What is the expected value of one ticket?
- \$0.64
 - \$0.64
 - \$4.36
 - \$4.36
10. In a study, 40% of adults questioned reported that their health was excellent. A researcher wishes to study the health of people living close to a nuclear power plant. Among 10 adults randomly selected from this area, only 3 reported that their health was excellent. Find the probability that when 10 adults are randomly selected, 3 or fewer are in excellent health.
- 0.2687
 - 0.1673
 - 0.2150
 - 0.3823
11. The probability that a tennis set will go to a tiebreaker is 16%. In 420 randomly selected tennis sets, what is the mean and the standard deviation of the number of tiebreakers?
- mean: 63; standard deviation: 8.2
 - mean: 63; standard deviation: 7.51
 - mean: 67.2; standard deviation: 7.51
 - mean: 67.2; standard deviation: 8.2
12. The chance of an IRS audit for a tax return with over \$125,000 in income is about 3%. A random sample of 60 taxpayers with incomes above \$125,000 is selected. Use this information to answer the following:
- How many taxpayers in the sample are expected to be audited?
 - What is the probability that exactly 4 of the selected taxpayers will be audited?
 - What is the probability that at most 4 of the selected taxpayers will be audited?
 - What is the probability that more than 2 of the selected taxpayers will be audited?

13. A distribution $X \sim U(2, 15)$. Find $P(3.5 < x < 8)$. Round answer to three decimal places.
- 0.654
 - 0.346
 - 0.467
 - 0.300
14. Suppose you arrive into a building and are about to take an elevator to your floor. Once you call the elevator, it will take between 2 and 40 seconds to arrive to you. We will assume that the elevator arrives uniformly between 2 and 40 seconds after you press the button. Find μ .
- 19
 - 21
 - 11
 - 22
15. A tire company finds the lifespan for one brand of its tires is normally distributed with a mean of 48,400 miles and a standard deviation of 5000 miles. If the manufacturer is willing to replace no more than 10% of the tires, what should be the approximate number of miles for a warranty?
- 55,000
 - 40,000
 - 42,000
 - 57,000
16. An airline knows from experience that the distribution of the number of suitcases that get lost each week on a certain route is approximately normal with $\mu = 15.5$ and $\sigma = 3.6$. What is the probability that during a given week the airline will lose more than 20 suitcases?
- 0.1056
 - 0.3944
 - 0.8944
 - 0.4040
17. The distribution of cholesterol levels in teenage boys is approximately normal with $\mu = 170$ and $\sigma = 30$.
- Find the probability that a randomly selected boy has a cholesterol level between 160 and 190 days.
 - If a sample of 35 medical records are randomly selected, what is the probability that the mean length of the pregnancies is between 160 and 190 days?
 - Find the cholesterol level that is at the 70th percentile.
18. The amount of snowfall falling in a certain mountain range is normally distributed with a mean of 105 inches and a standard deviation of 10 inches. What is the probability that the mean annual snowfall during 25 randomly picked years will exceed 107.8 inches?
- 0.0808
 - 0.4192
 - 0.0026
 - 0.5808

19. Use the given information to find the mean and standard deviation for the sampling distribution of $\bar{x}$. The mean and the standard deviation of the sampled population are, $\mu = 77.4$ and $\sigma = 4.0$. Sample size is $n = 225$
- $\mu = 0.3; \sigma = 77.4$
 - $\mu = 77.4; \sigma = 0.3$
 - $\mu = 20.6; \sigma = 0.8$
 - $\mu = 4.0; \sigma = 0.3$
20. For samples of the specified size from the population described, find the mean and standard deviation of the sample mean $\bar{x}$. The National Weather Service keeps records of rainfall in valleys. Records indicate that in a certain valley, the annual rainfall has a mean of 70 inches and a standard deviation of 12 inches. For samples of size 36, determine the mean and standard deviation of $\bar{x}$.
- $\mu = 70; \sigma = 2$
 - $\mu = 12; \sigma = 70$
 - $\mu = 70; \sigma = 12$
 - $\mu = 2; \sigma = 70$
21. When 345 college students are randomly selected and surveyed, it is found that 110 own a car. Use this data to find a 99% confidence interval for the true proportion of all college students who own a car.
- $0.254 < p < 0.383$
 - $0.270 < p < 0.368$
 - $0.260 < p < 0.377$
 - $0.278 < p < 0.360$
22. A sample of 15 randomly selected students from a certain college has a grade point average of 2.86 with a standard deviation of 0.78. Assuming the population has a normal distribution, use the sample data to construct a 90% confidence interval for the population mean, μ , of GPA's for all students at this college.
- (2.51, 3.21)
 - (2.37, 3.56)
 - (2.41, 3.42)
 - (2.28, 3.66)
23. A botanist wishes to estimate the average number of seeds for a certain fruit. She randomly selects 48 pieces of this fruit, and counts the number of seeds in each. The sample produced a mean of 22.7 seeds with a standard deviation of 12.6 seeds. Assume that the number of seeds per fruit is normally distributed.
- Use the sample data to find a 95% confidence interval for the mean number of seeds per fruit.
 - What is the margin of error for this estimate?
 - Suppose we wish to estimate the mean number of seeds per fruit with 95% confidence and a margin of error of 2 seeds. What would be the minimum sample size required?

24. Find the necessary sample size to estimate a mean to within \$123 with 95% confidence if the standard deviation is \$546.
- a. 67
 - b. 76
 - c. 4
 - d. 2