

For #1 and #2. Let $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$

$$M = \{1, 3, 5\}$$

$$N = \{1, 2, 4, 6\}$$

$$P = \{1, 5, 8\}$$

List the members of each of the following sets, using set braces.

#1. $(M' \cup P) \cap N$

$$M' = \{2, 4, 6, 7, 8\}$$

$$M' \cup P = \{1, 2, 4, 5, 6, 7, 8\}$$

$$(M' \cup P) \cap N = \{1, 2, 4, 6\}$$

#2. $(P \cup M)' \cap N'$

$$P \cup M = \{1, 3, 5, 8\}$$

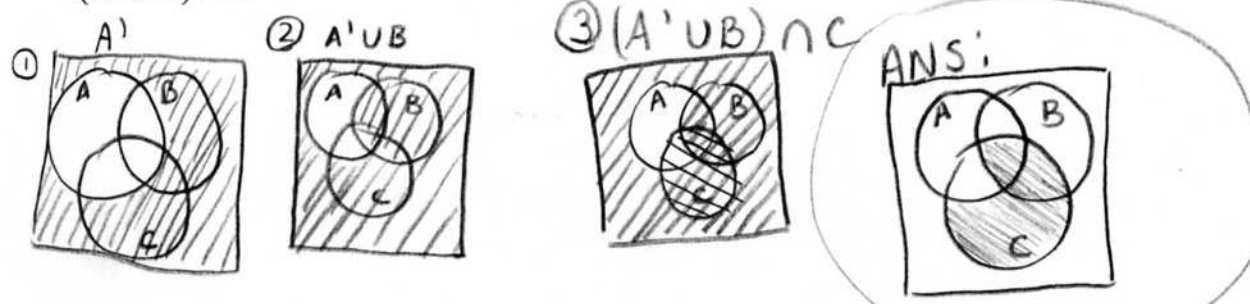
$$(P \cup M)' = \{2, 4, 6, 7\}$$

$$N' = \{3, 5, 7, 8\}$$

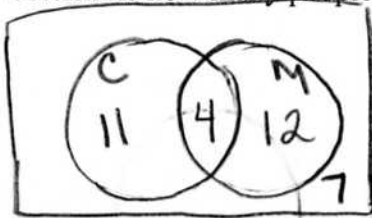
$$(P \cup M)' \cap N' = \{7\}$$

#3. Let A, B and C be three sets. Draw a Venn Diagram and use shading to show the set: PLEASE REDRAW YOUR FINAL ANSWER AND CIRCLE IT!

$$(A' \cup B) \cap C$$



#4. In a survey, 15 people drank coffee with breakfast, 16 drank milk, 4 drank both and 7 people drank neither coffee nor milk. Use a Venn Diagram to determine how many people were surveyed.

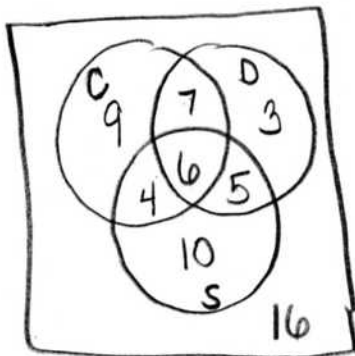


$$\begin{aligned} \text{Coffee} &= 15 \\ \text{Milk} &= 16 \\ \text{Coffee} \cap \text{Milk} &= 4 \\ (\text{Coffee} \cup \text{Milk})' &= 7 \end{aligned}$$

$$11 + 4 + 12 + 7 = 34 \text{ people were surveyed}$$

#5. Sixty people were contacted and responded to a movie survey. The following results were obtained.

- 6 people liked comedies, dramas AND sci-fi.
 - 13 people liked comedies and dramas.
 - 10 people liked comedies and sci-fi.
 - 11 people liked dramas and sci-fi.
 - 26 people liked comedies.
 - 21 people liked dramas.
 - 25 people liked sci-fi.
- How many people don't like movies at all?



$$\begin{aligned} C \cap D \cap S &= 6 \\ C \cap D &= 13 \\ C \cap S &= 10 \\ D \cap S &= 11 \\ C &= 26 \\ D &= 21 \\ S &= 25 \end{aligned}$$

$$9 + 7 + 3 + 4 + 6 + 5 + 10 = 44$$

$$60 - 44 = 16$$

16 don't like these movies.

For #6 and #7: Each month of the year is written on a 3 by 5 card and the cards are placed in a hat so that one card can be drawn.

#6. Write the sample space.

{ January, February, March, April, May, June
July, August, September, October, November, December }

#7. What is the probability that the card begins with a vowel?

months beginning with vowel = 5

months = 12

#8. If the odds that a particular horse will win a race are 7:1, what is the probability that the horse will NOT win the race?

Odds in favor = 7:1

odds against = 1:7

Prob (loss) = $\frac{1}{8}$

#9. Telephone numbers in the United States begin with three-digit area codes followed by seven-digit local telephone numbers. Area codes and local telephone numbers cannot begin with 0 or 1. How many different telephone numbers are possible?

Multiplication Principle

2-9 0-9

$\underbrace{8}_{2-9} \underbrace{10}_{0-9} \underbrace{10}_{0-9} - \underbrace{8}_{2-9} \underbrace{10}_{0-9} \underbrace{10}_{0-9} - \underbrace{10}_{0-9} \underbrace{10}_{0-9} \underbrace{10}_{0-9} =$

648 different telephone numbers are possible.

#10. Car manufacturers are now experimenting with lightweight three-wheeled cars, designed for a driver and one passenger, and considered ideal for city driving. Suppose you could order such a car with a choice of 9 possible colors, with or without air-conditioning, with or without a removable roof, and with or without an onboard computer. In how many ways can this car be ordered in terms of options?

Multiplication Principle

$9 * 2 * 2 * 2 = 72$ different ways.

#11. A group consists of 10 Democrats, 5 Republicans and 4 Independents. In how many ways can a committee consisting of 2 Democrats, 2 Republicans and 2 Independents be selected?

Combinations

$$C(10, 2) * C(5, 2) * C(4, 2) =$$

$$45 * 10 * 6 = \boxed{2700 \text{ different committees}}$$

#12. Five groups in a tour, Offspring, Pink Floyd, Sublime, the Rolling Stones, and the Beatles, agree to determine the order of performance based on a random selection. Each band's name is written on one of five cards. The cards are placed in a hat and then five cards are drawn out, one at a time. The order in which the cards are drawn determines the order in which the bands perform. What is the probability of the Rolling Stones performing fourth and the Beatles last?

options \rightarrow $\boxed{3} \boxed{2} \boxed{1} \boxed{1} \boxed{1} =$ # ways R.S. to 4th & B to 5

Prb = $\frac{\text{\# ways RS to 4th & B to 5th}}{\text{\# ways they can be arranged}} = \frac{6}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = \frac{6}{120} = \frac{1}{20}$

$\boxed{.05}$

#13. A club consists of five men and seven women. Three members are selected at random to attend a conference. Find the probability that the selected group consists of:

- three men.
- one man and two women.

a. $C(5, 3) * C(7, 0) = 10 / C(12, 3) = 10 / 220 = 1/22$

b. $C(5, 1) * C(7, 2) = 105 / C(12, 3) = 105 / 220 = 21/44$

#14. A die is rolled once. Find the Probability of getting a number less than 5.

$$\begin{aligned} \# \text{ of numbers less than } 5 &= \frac{4}{6} = \frac{2}{3} \approx .66 \\ &\text{1, 2, 3, 4} \\ \# \text{ of numbers on die} &= 6 \end{aligned}$$

The number of units carried in one semester by students in a business mathematics class was as follows:

10 9 16 12 13 15 13 16 15 14 13 12 12 15 12 14 10 12 14
15 15 13

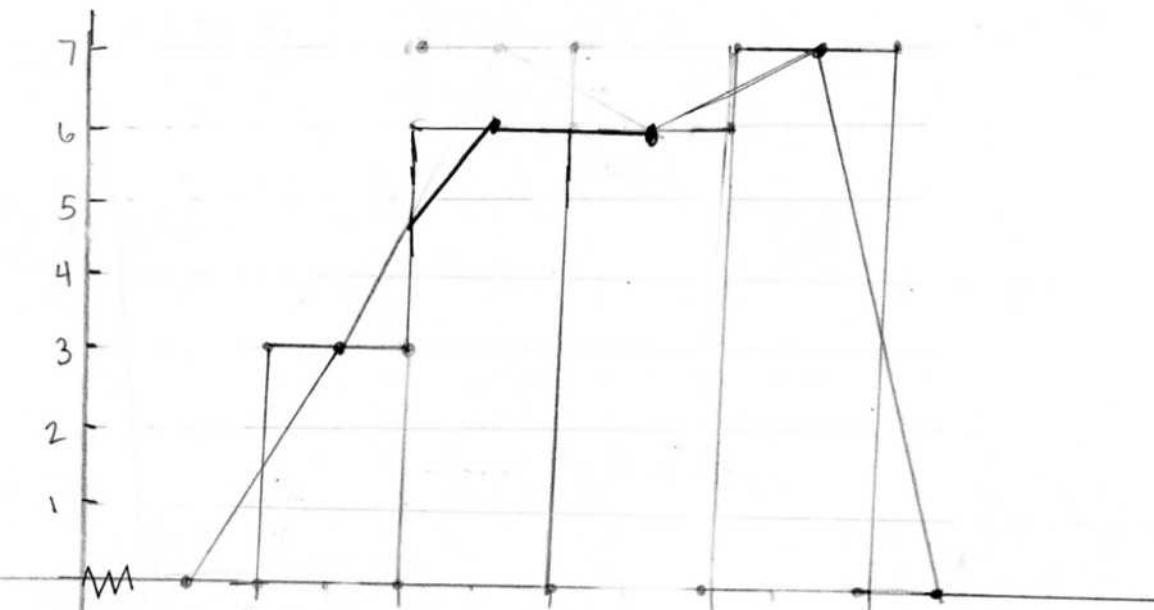
Use intervals 9-10, 11-12, etc.

#15. Write a frequency distribution.

Credits	Tally	f
9-10		3
11-12	1	6
13-14	1	6
15-16	11	7

#16. Draw a histogram.

#17. Draw a frequency polygon.



Consider the following list of test scores:

98 70 32 48 71 80 85 50 46 71

For this data find each of the following. ROUND to the nearest TENTH when necessary.

#18. The mean.

$$\text{mean} = \frac{98 + 70 + 32 + 48 + 71 + 80 + 85 + 50 + 46 + 71}{10}$$

$$= 65.1$$

#19. The median.

98, 85, 80, 71, (71), (70), 50, 48, 46, 32

$$\text{place} = \frac{n+1}{2} = \frac{10+1}{2} = 5.5 = \text{Mean of 5th + 6th}$$

$$\frac{71 + 70}{2} = 70.5$$

Median = 70.5

#20. The mode.

Mode = 71

#21. The range.

range = largest - smallest.

$$= 98 - 32 = 66$$

range = 66

#22. Find the standard deviation for the following set of numbers.

ROUND to the nearest hundredth. 14, 5, 9, 3, 11, 12

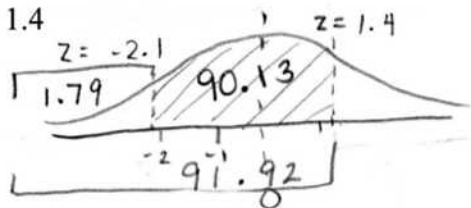
x	x - mean	(x - mean) ²
14	14 - 9 = 5	25
12	12 - 9 = 3	9
11	11 - 9 = 2	4
9	9 - 9 = 0	0
5	5 - 9 = -4	16
3	3 - 9 = -6	36

$$\text{① mean} = \frac{14 + 5 + 9 + 3 + 11 + 12}{6}$$

$$\text{② SD} = \sqrt{\frac{90}{n-1}} = \sqrt{\frac{90}{6-1}} = \sqrt{\frac{90}{5}} = \sqrt{18} = 4.24$$

the standard deviation is about 4.24

#23. Find the percent of the total area under the standard normal curve between $z = -2.1$ and $z = 1.4$



$$\begin{array}{r} 91.92 \\ - 1.79 \\ \hline 90.13 \end{array}$$

#24. Find the mean for the following data. ROUND to the nearest hundredth.

x	f	xf
Value	Frequency	
1	5	5
3	8	24
5	10	50
7	3	21
9	4	36
	<u>4</u>	<u>136</u>
	$n = 30$	

$$\text{mean} = \frac{\text{sum}(xf)}{n}$$

$$\text{mean} = \frac{136}{30} = \boxed{4.53}$$

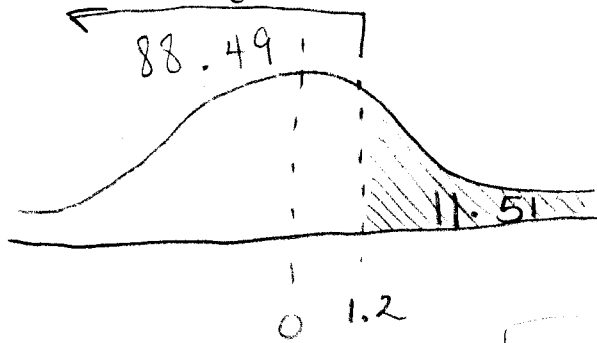
#25. A student scores 60 on a vocabulary test and 80 on a grammar test. The data items for both tests are normally distributed. The vocabulary test has a mean of 50 and a standard deviation of 5. The grammar test has a mean of 72 and a standard deviation of 6. On which test did the student have the better score?

$$Z_{\text{vocab}} = \frac{60 - 50}{5} = \frac{10}{5} = 2$$

$$Z_{\text{grammar}} = \frac{80 - 72}{6} = \frac{8}{6} = 1.33$$

The student had a better score on the vocabulary test.

#26. The mean cholesterol level for all men in the United States is 200 and the standard deviation is 15. Find the percentage of U.S. men whose cholesterol level is greater than 218.



$$\begin{aligned} \text{mean} &= 200 \\ \text{std} &= 15 \end{aligned}$$

$$Z = \frac{218 - 200}{15} = \frac{18}{15} = 1$$

less than 218 is 88.49%. Greater than 218 is 11.51%

#27. A single die is tossed. Find the probability that the tossed die shows 3, given that the outcome is a number less than 4

$$\begin{aligned} \# \text{ outcomes of } 3 \text{ possible if the outcome } < 4 &= 1 \\ \# \text{ outcomes if die } < 4 &= 1, 2, 3 \\ \frac{1}{3} &= .33 \end{aligned}$$

#28. In how many distinct ways can the letters of the word "CONNECTION" be arranged?

$$= \frac{10!}{2!2!3!1!1!1!} = 151,200$$

C's
 O's
 N's

↑
 ↑
 ↑
 ↑
 ↑
 ↑

2's 2's 3's 1's 1's 1's
 C's O's N's

#29. List all the proper subsets for the set {Santa, Elf, Tree}

- ∅
- {Santa}
- {Elf}
- {Santa, Elf}
- {Santa, Tree}