

Instructions: Show all work or you will not receive full credit. Provide exact, fully-reduced answers, unless specifically asked to round. Be sure to provide complete explanations, and answer all parts of each question.

1. Complete the relative frequency table below (9 points)

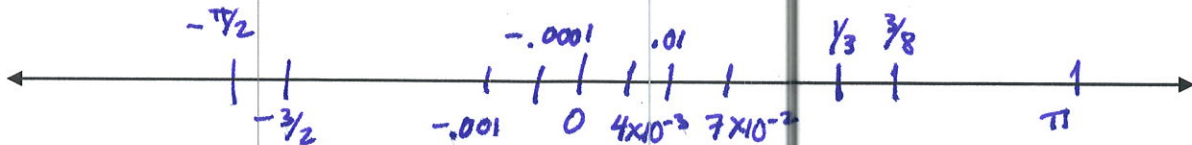
Majors	Counts	Reduced Fractions	Decimals (4 places)	Percents (tenths of a percent)
Humanities	15	$\frac{15}{104}$	0.1442	14.4%
Mathematics	7	$\frac{7}{104}$	0.0673	6.7%
Natural Sciences	23	$\frac{23}{104}$	0.2212	22.1%
Social Sciences	31	$\frac{31}{104}$	0.2981	29.8%
Technology & Engineering	28	$\frac{28}{104}$	0.2692	26.9%
Total	104	1	1.000	100%

2. Write 0.375 as a fraction in reduced form. (2 points)

$$\frac{375}{1000} = \frac{15}{40} = \frac{3}{8}$$

3. Place the following numbers in order on the number line. (5 points)

$$\left\{ \pi, -\frac{3}{2}, -\frac{\pi}{2}, 4 \times 10^{-3}, 7 \times 10^{-2}, 0.01, \frac{3}{8}, \frac{1}{3}, 0, -0.001, -0.0001 \right\}$$



4. Evaluate each expression. (4 points)

a. $(-2)^4$

16

b. -3^2

-9

c. $\sqrt{729}$

27

d. $\frac{8!}{3!}$

6720

5. Simplify $\frac{|6-2^3|}{7^2-2 \cdot 5^2}$. (3 points)

$$\frac{|6-8|}{49-2 \cdot 25} = \frac{|-2|}{49-50} = \frac{2}{-1} = -2$$

6. Convert to scientific notation. (2 points)

a. 419,000,000,000,000

$$4.19 \times 10^{14}$$

b. 0.00000006

$$6 \times 10^{-8}$$

7. Write in decimal notation. (2 points)

a. 8.32×10^{19}

$$83,200,000,000,000,000,000$$

b. 5.4×10^{-4}

$$0.00054$$

8. Evaluate $\frac{x^2-y}{3-xy}$ for $x = -1, y = 2$ (2 points)

$$\frac{(-1)^2-2}{3-(-1)(2)} = \frac{1-2}{3+2} = \frac{-1}{5}$$

9. Evaluate $\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$ for $\{x_1 = 3, x_2 = 4, x_3 = 6, x_4 = 11, x_5 = 12\}$. (2 points)

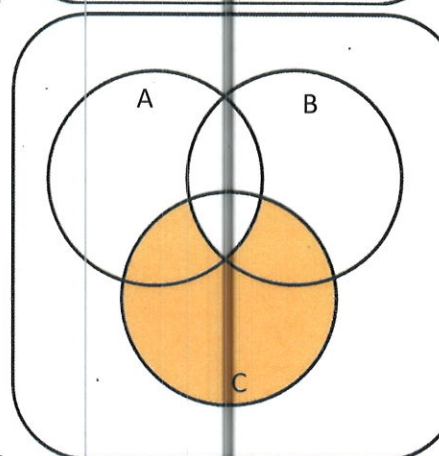
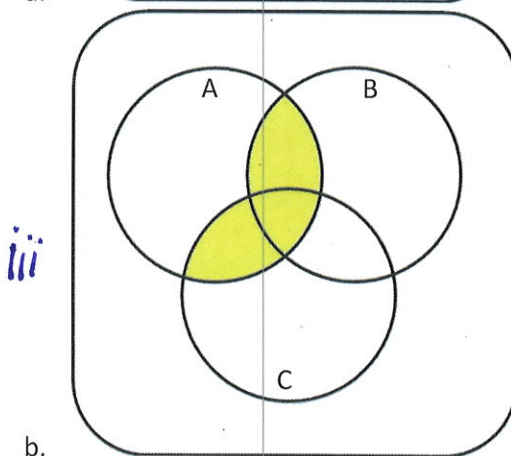
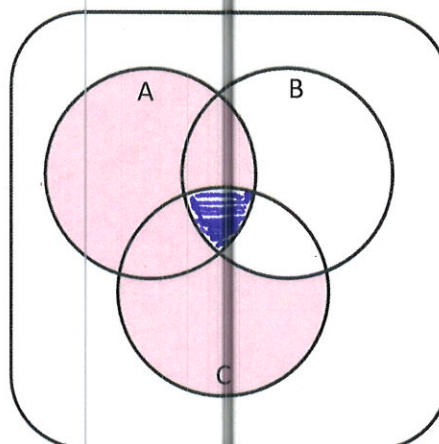
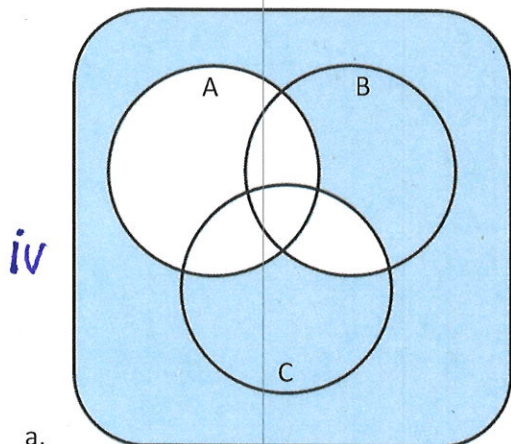
$$\bar{x} = \frac{1}{5} (3+4+6+11+12) = \frac{36}{5} = 7.2$$

10. In statistical notation, what does a $\hat{\cdot}$ indicate? (i.e. \hat{p}, \hat{y} , etc.) (2 points)

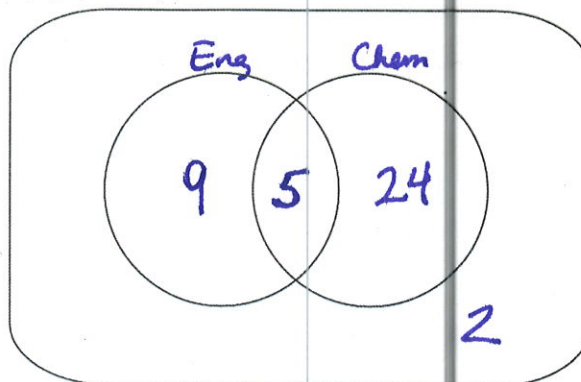
it indicates an estimate for a particular parameter

11. Match the Venn diagrams to the set notation. (4 points)

- i. $A \cup (C - B)$ *c*
- ii. $C - (A \cap B)$ *d*
- iii. $(C \cup B) \cap A$ *b*
- iv. $A' - (B \cap C)$ *a*



12. Out of 40 students, 14 are taking English, 29 are taking chemistry, with 5 students in both classes. Use the Venn diagram below to determine how many students are taking neither. Be sure to label the diagram appropriately. (2 points)



13. If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K\}$, $A = \{1, 3, 7, 10, Q, K\}$, $B = \{2, 6, 8, J, Q\}$, $C = \{2, 3, 4, 5, 9, K\}$, find the following. (4 points)

a. $A \cup B$

$$\{1, 2, 3, 6, 7, 8, 10, J, Q, K\}$$

b. $A \cap B$

$$\{Q\}$$

c. $C - B$

$$\{3, 4, 5, 9, K\}$$

d. A^c

$$\{2, 4, 5, 6, 8, 9, J\}$$

14. Use the table below to answer the questions that follow. (5 points)

	Wearing Yellow	Not Wearing Yellow	Totals
Blue Eyes	10	2	12
Not Blue Eyes	30	20	50
Totals	40	22	62

a. What is the probability that a randomly selected person from the sample has blue eyes?

$$\frac{12}{62} = \frac{6}{31}$$

b. What is the probability that a randomly selected person from the sample is wearing yellow?

$$\frac{40}{62} = \frac{20}{31}$$

c. What is the probability that a randomly selected person from the sample is wearing yellow and has blue eyes?

$$\frac{10}{62} = \frac{5}{31}$$

d. What is the probability that a randomly selected person from the sample is wearing yellow or has blue eyes?

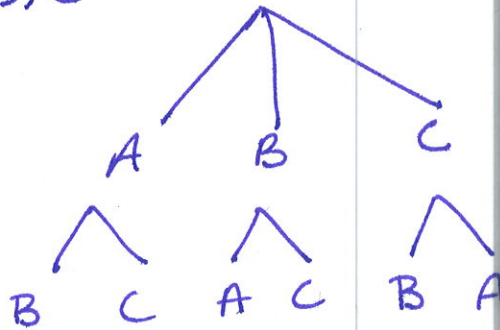
$$\frac{10+2+30}{62} = \frac{40}{62} + \frac{12}{62} - \frac{10}{62} = \frac{21}{31}$$

e. Is wearing yellow and having blue eyes independent? Why or why not? Show work to justify your answer.

$$\frac{6}{31} \cdot \frac{20}{31} = \frac{120}{961} \neq \frac{5}{31} \quad \text{They are dependent in this sample}$$

15. Mrs. Miller has three children. She distributes the chores for mowing the lawn and taking out the garbage randomly. If no child can be given both chores, draw a tree diagram to find all the ways the chores can be distributed. (4 points)

3 kids A, B, C



mow lawn

take out garbage

$\{AB, AC, BA, BC, CB, CA\}$

16. In California, they have 9 positions on their license plates instead of seven. If every position could be a letter or a number, how many different license plates does California have? (2 points)

$$36^9 = 1.02 \times 10^{14}$$

17. A raffle has 100 tickets sold. How many different ways can three equal door-prizes be awarded? (2 points)

$$100C3 = 161,700$$

18. A raffle has 100 tickets sold. How many different ways can first, second and third place be awarded? (2 points)

$$100P3 = 970,200$$

19. Two standard dice are rolled. What is the probability of obtaining a sum of 6? (2 points)

1,5
5,1
2,4
4,2
3,3

$$\frac{5}{36}$$

