

Exam 1

Remember: Leave me some clues!

1. Use Gauss' method to find the following sums. **4 points each**

a) $1 + 2 + 3 + 4 + \cdots + 899 + 900 + 901 + 902$

b) $1 + 3 + 5 + 7 + \cdots + 793 + 795 + 797 + 799$

c) $4 + 8 + 12 + 16 + \cdots + 400 + 404 + 408 + 412$

2. A survey is taken of 100 health club members regarding their use of the club's exercise facilities. The following information was obtained.

16 use the gym, pool, and weight room.

29 use both the gym and the pool.

23 use both the gym and the weight room.

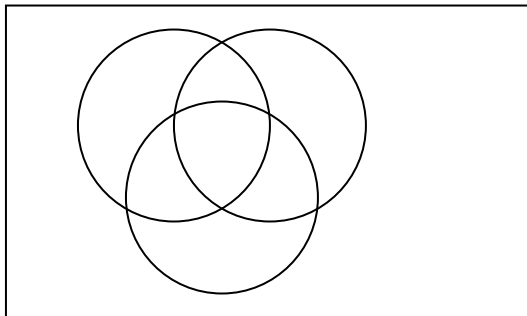
40 use the gym.

68 use either the gym or the pool.

14 use only the pool.

18 use none of the three facilities.

- a) Construct a Venn diagram to model the above information. **4 points**
Use the Venn diagram to answer the following questions. **2 points each**
- b) How many use the pool?
- c) How many use only the weight room?
- d) How many use at most one of these facilities?
- e) How many use the gym and the weight room but not the pool?
- f) How many use the gym or the weight room but not the pool?
- g) How many do not use the pool?
- h) How many use the gym or the weight room?



3. Use inductive reasoning to predict the next three numbers in the sequence.

3 points each

a) 0, 3, 8, 15, 24, 35, 48, 63, ...

b) 5, 3, 1, -1, -3, ...

c) $5, -\frac{10}{3}, \frac{20}{9}, -\frac{40}{27}, \dots$

d) 0, 4, 8, 12, 16, ...

4. Let $A = \{d, e, f\}$. **5 points**

a) How many subsets does set A?

b) List all the possible subsets of A?

5. While playing the board game Political Reality, Bob had to pay half of his slush fund of money to buy television time for one-minute commercials. On his next play, however, he received word that he had received a \$1500 cash donation from a local toxic-waste producer. On his third play, he was informed that additional contributions had doubled his bank account, but from this new amount he was forced to pay \$1250 in taxes. If the game ended here and Bob still had \$2100 in his account, with how much money did he begin the game? **5 points**

6. Define the sets A, B, and C as follows: $A = \{3, 9, 13\}$, $B = \{13, 9\}$ and $C = \{3, 9, 13, 24, 33\}$.

a) Which of the sets A, B, and C are subsets of A? **2 points**

b) Which of the following statements are true? **2 points each**

a. $13 \in B$

b) $13 \subseteq B$

c) $\{13\} \subseteq B$

d) $\{13\} \in B$

e) $\{3, 9, 13\} \subseteq C$

f) $\{3, 9, 13\} \in C$

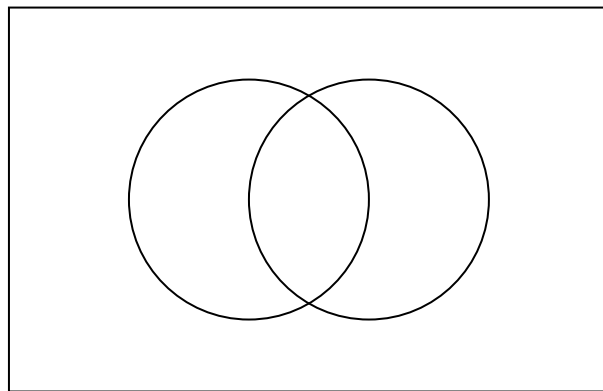
g) $\emptyset \in A$

h) $\emptyset \subseteq A$

7. Find the 117th digit in the decimal representation of $\frac{4}{7}$? **5 points**

8. Let A and B be sets where $n(U) = 50$, $n(A) = 11$, $n(B) = 41$, and $n(A \cup B) = 43$. **10 points**

- a) Sketch a Venn diagram that illustrates the number of elements with each region. Using this diagram, find:
- b) $n(A \cap B)$
- c) $n(A \cup B)'$
- d) How many elements are only in set A?
- e) How many elements are only in set B?



9. Set A has 47 elements and Set B has 25 elements. Use Venn diagrams to verify your answers. **3 points each**

a) What is the maximum number of elements possible in $A \cup B$?

b) What is the minimum number of elements possible in $A \cup B$?

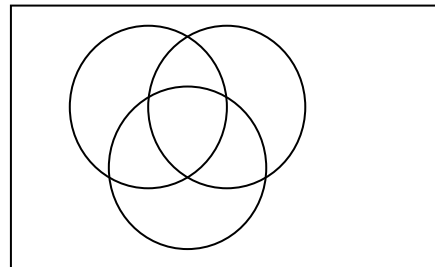
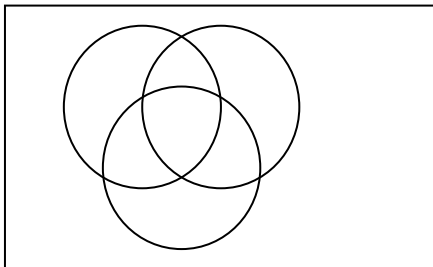
c) What is the maximum number of elements possible in $A \cap B$?

d) What is the minimum number of elements possible in $A \cap B$?

10. Shade the appropriate region in the Venn diagram. Remember, show some work. **4 points each**

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

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

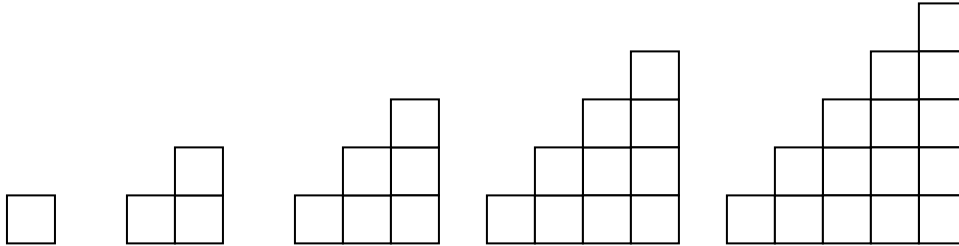


11. In how many different ways can a panel of four on-off switches be set if no two adjacent switches may be off? **4 points**

12. Use the method of successive differences to determine the next number in the sequence. **4 points**

3,19,165,771,2503,6483,14409,...

13. Baby Sasha is building a staircase out of blocks using the pattern below. **6 points**



- a) How many blocks will she need to build a staircase that is 20 blocks high?
- b) If she just build a staircase using 56 blocks, how high is the staircase?

14. Decide whether each of the following is an example of inductive or deductive reasoning. **2 points each**

- a) All students whom Tracy tutors gets A's. If Tracy tutors me, I'll get an A.
- b) A woman earned the highest grade in math. Shannon earned the highest grade in math. Shannon is a woman.
- c) All squares are rectangles. Joseph is a square. Therefore, Joseph is a rectangle.