

4. In 1996, Lisa and Kevin bought a home for \$125,000. They put 5% down and then financed the remaining price of the home with a 30 year mortgage at an 8.54% annual interest rate compounded monthly on the unpaid balance.
- (a) What were their monthly payments?

 - (b) In 2006 they decided to refinance the home with a 20 year mortgage at a 6.5% annual interest rate compounded monthly on the unpaid balance. What are their new monthly payments?

 - (c) How much money are they saving in interest by refinancing?
5. Chris has been living it up and has accrued \$6,000 of credit card debt on a card that charges 18.4% per year compounded monthly on the unpaid balance. But lucky for Chris the minimum payment due each month is only \$95.
- (a) Assuming he doesn't make any more purchases, how long will it take Chris to pay off his debt?

 - (b) If Chris decides to pay \$50 extra a month, how long will it take Chris to pay off his debt?

 - (c) How much money is he saving by paying a little extra each month?

Section 6.1

- We can either use **roster notation** or **set-builder notation** to represent a set.
 - Two sets A and B are **equal**, written $A = B$, if and only if they have exactly the same elements.
 - If every element of a set A is also an element of a set B , then we say that A is a **subset** of B and write $A \subseteq B$.
 - If A and B are sets such that $A \subseteq B$ but $A \neq B$, then we say A is a **proper subset** of B written $A \subset B$
 - The set that contains no elements is called the **empty set** and is denoted by \emptyset . It is a subset of all sets.
 - The **universal set** is the set of all elements of interest in a particular problem.
 - We use **Venn Diagrams** to visually represent sets. The universal set U is represented by a rectangle and subsets of U are represented by circles inside of the rectangle.
 - The **union** of A and B , written $A \cup B$ is the set of all elements that belong to either A or B or both.
 - The set of elements in common with the sets A and B , written $A \cap B$, is called the **intersection** of A and B .
 - The **complement** of A , denoted A^c is the set of all elements in U that are not in A .
 - Two sets A and B are **disjoint** if $A \cap B = \emptyset$.
 - **De Morgan's Laws:** Let A and B be sets. Then $(A \cup B)^c = A^c \cap B^c$ and $(A \cap B)^c = A^c \cup B^c$.
6. Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, $A = \{1, 3, 5, 7, 9\}$, $B = \{2, 4, 6, 8, 10\}$, $C = \{1, 5, 8, 9\}$, $D = \{8, 10\}$. Find the following:
- (a) $A \cup C$
 - (b) $B \cap D$
 - (c) C^c
 - (d) $A \cup (B \cap D)$
 - (e) $C \cap (A \cup D)^c$
7. Using the sets from the previous example, determine whether each statement is true or false:
- (a) $D \subset B$
 - (b) $\{2, 4, 6, 8, 10\} \subset B$
 - (c) $8 \in D$
 - (d) $\{1, 8\} \in C$
8. List all subsets of the set A where $A = \{x \mid x \text{ is an integer between } 3 \text{ and } 5 \text{ inclusive}\}$.

9. For each part, draw a Venn Diagram with 3 sets, A , B , and C , and shade the region that represents each set.

(a) $B \cap A^c \cap C^c$

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

(c) $A \cup (B \cap C)^c$

Section 6.2

- $n(A)$ represents the number of elements in a set.
- $n(A \cup B) = n(A) + n(B) - n(A \cap B)$
- We can label each region in a Venn Diagram with the number of elements in it to sort out the given information.

10. If $n(A) = 15$, $n(B) = 23$, and $n(A \cap B) = 5$, what is $n(A \cup B)$?

11. A Universal Set consists of 3 subsets. We are given the following information:

- $n(A \cap B^c \cap C^c) = 10$
- $n(A) = 25$
- $n(B \cap C) = 10$
- $n(C) = 30$
- $n(B^c) = 35$
- $n(A \cap C \cap B^c) = 9$
- $n(A \cap B \cap C) = 2$
- $n(C^c) = 22$.

Fill out the Venn Diagram with this information and use it to find $n(B \cup C)$.

12. A survey was conducted of 100 student's dining preferences. They were all asked their preference on eating at Chipotle, Fitzwilly's, and Potbelly's. The following information was determined:

- 20 students like only Fitzwilly's.
- 30 students like exactly two of the restaurants.
- 50 students like Potbelly's
- 5 students like all three restaurants.
- 15 students like Chipotle and Fitzwilly's.
- 8 students like only Fitzwilly's and Potbelly's
- 60 students do not like Chipotle.

Fill out the Venn Diagram with this information and use it to determine how many students do not like Fitzwilly's.