

1. A local university made a study of binge alcohol drinking and classifies its students into the following sets: $A = \{\text{the student is a binge drinker}\}$, $B = \{\text{the student lives in a coed dorm}\}$, and $C = \{\text{the student is male}\}$. Express each of the following sets in terms of unions, intersections, and/or complements:

- (a) $\{\text{the student is a female binge drinker}\}$
- (b) $\{\text{the student is a female and not a binge drinker}\}$
- (c) $\{\text{the student is a male or lives in a coed dorm}\}$

2. An automobile insurance company classifies applicants by their driving records for the previous three years. Let $S = \{\text{applicants who have received speeding tickets}\}$, $A = \{\text{applicants who have caused accidents}\}$ and $D = \{\text{applicants who have been arrested for driving while intoxicated}\}$.

Describe the following sets in terms of unions, intersections, and/or complements:

- (a) $\{\text{applicants who have not received speeding tickets}\}$
- (b) $\{\text{applicants who have caused accidents and been arrested for drunk driving}\}$
- (c) $\{\text{applicants who have received speeding tickets, caused accidents, or been arrested for drunk driving}\}$
- (d) $\{\text{applicants who have not been arrested for drunk driving but have received speeding tickets}\}$
- (e) $\{\text{applicants who have not caused accidents or have not been arrested for drunk driving}\}$

3. In our Math 1101 class let $U = \{\text{all students}\}$, $F = \{\text{all females}\}$, $A = \{\text{all athletes}\}$, and $B = \{\text{all brown-eyed students}\}$

- (a) Express the following set in terms of unions, intersections, and/or complements:

$\{\text{all brown-eyed, male athletes}\}$

- (b) **Describe** in a sentence the set defined by $F \cap A^c$.

4. Let $U = \{\text{students enrolled in a given math class}\}$, $E = \{\text{those students enrolled in an English class}\}$, $H = \{\text{those students enrolled in a history class}\}$, and $G = \{\text{those students enrolled in a geology class}\}$.

Describe the following sets in terms of unions, intersections, and/or complements:

- (a) The set of students who are enrolled in English and history but not geology.
- (b) The set of students who are not enrolled in these three classes.
- (c) The set of students who are enrolled in geology or English but not history.

5. Let $U = \{\text{people at Mount College}\}$, $A = \{\text{students at Mount College}\}$, $B = \{\text{teachers at Mount College}\}$ and $C = \{\text{females at Mount College}\}$. Describe each of the sets in words:

(a) $A \cap C^c$

(b) $B \cup A$

6. Let $U = \{\text{all members of the US senate}\}$, $A = \{\text{all Republican senators}\}$, $B = \{\text{all Democratic senators}\}$, $C = \{\text{all male senators}\}$, and $D = \{\text{all female senators}\}$.

Describe the following sets in terms of unions, intersections, and/or complements:

(a) The set of all female Republican senators.

(b) The set of all senators who are not Republican.

(c) The set of all senators who are either male or are Democrats.

7. Let $U = \{\text{all NU students}\}$, $A = \{\text{all female NU students}\}$, $B = \{\text{all NU students taking French}\}$, and $C = \{\text{all NU students taking Math 1101}\}$

(a) Describe the following set in terms of unions, intersections, and/or complements:

$\{\text{all male students taking French}\}$

(b) Describe in a sentence the set defined by $B \cup C$.

8. Let $U = \{\text{all employees in a hospital}\}$, $N = \{\text{all nurses}\}$, $D = \{\text{all doctors}\}$, $A = \{\text{all administrators}\}$, $M = \{\text{all males}\}$, and $F = \{\text{all females}\}$

Describe each of the sets in words:

(a) $N \cup D$

(b) $D \cup M$

(c) $N \cap M$

(d) $D \cap A$

(e) D^c

(f) $F \cap D \cap A$

9. Let $U = \{\text{all college students}\}$, $M = \{\text{all male college students}\}$, and $F = \{\text{all college students who like football}\}$.

Describe the following sets in words:

(a) M^c

(b) $M^c \cap F^c$

(c) $M \cup F$