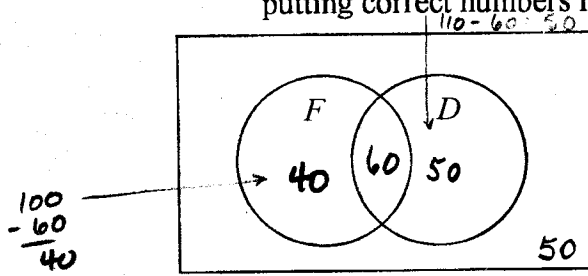


Math 106 - Classwork
Problems on Venn Diagrams

Names ANSWER KEY
 March 5, 2009

1. 200 college students were surveyed after voting in an election involving a Democrat and a Republican. 100 were first-year students (set F), 110 voted for the Democrat (set D), and 50 were non-first-year students who voted for the Republican.
- a) Complete the Venn diagram below to illustrate this problem. Label all areas, putting correct numbers in each area, so that all students are accounted for.

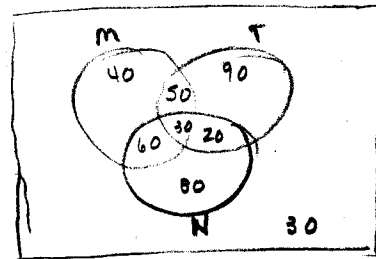


Note: Republican = Not Democrat (D')
 $n(F \cup D)' = 50$, so $n(F \cup D) = 200 - 50 = 150$
 AND
 $n(F \cup D) = n(F) + n(D) - n(F \cap D)$. So
 $150 = 100 + 110 - n(F \cap D) = 210 - n(F \cap D)$
 $-60 = -n(F \cap D) \Rightarrow 60 = n(F \cap D)$

- b) How many first-year students voted for the Republican? 40 ($\neq 124$ yrs, Not in D)
 c) How many non-first-year students voted for the Democrat? 50

2. A merchant surveyed 400 people as they walked in the door of the store to determine the way they learned about a current sale. The survey showed the following results:

- 180 learned about the sale from a mailing (set M).
- 190 learned about the sale from television (set T).
- 190 learned about the sale from newspapers (set N).
- 80 learned about the sale from a mailing and television
- 90 learned about the sale from a mailing and newspapers.
- 50 learned about the sale from television and newspapers.
- 30 learned about the sale from all three sources.



- a) On a separate sheet of paper create a Venn Diagram to reflect all of the information above, showing the cardinality of each region.
- b) How many people learned of the sale from newspapers or a mailing but not both?
190 $40 + 50 + 20 + 80$
- c) How many people learned of the sale from at least two of the three media?
160 $50 + 30 + 60 + 20$ ← means 2 or 3 media
- d) How many people learned of the sale from exactly one of the media?
210 $40 + 90 + 80$
- e) How many people learned of the sale from television or newspapers but not from a mailing?
190 $90 + 20 + 80 = 190$