Math 200 - Quiz 3

February 24, 2010

Name **key**

Score _____

Show each step to receive full credit. Supply explanations when necessary.

1. (2 points) On a three-set Venn diagram (one for each part of the problem), shade the region corresponding to each of the following.

   (a) $(A - B) \cap C$

   > SEE ATTACHED SHEET.

   (b) $\overline{B} \cap (A \cup C)$

   > SEE ATTACHED SHEET

2. (1 point) Use two-set Venn diagrams to show that $\overline{A \cup B} = \overline{A} \cap \overline{B}$. (Hint: Draw the Venn diagram for each one.)

   > SEE ATTACHED SHEET.

3. (2 points) In a survey of 160 automobile owners, the following data were obtained:

   - 53 own Fords
   - 74 own Toyotas
   - 55 own Chevrolets
   - 21 own both Fords and Toyotas
   - 13 own both Fords and Chevrolets
   - 19 own both Toyotas and Chevrolets
   - 8 own all three types of cars

   > SEE ATTACHED SHEET.

   Organize this data in a three-set Venn diagram. How many of those surveyed owned none of these types of cars?
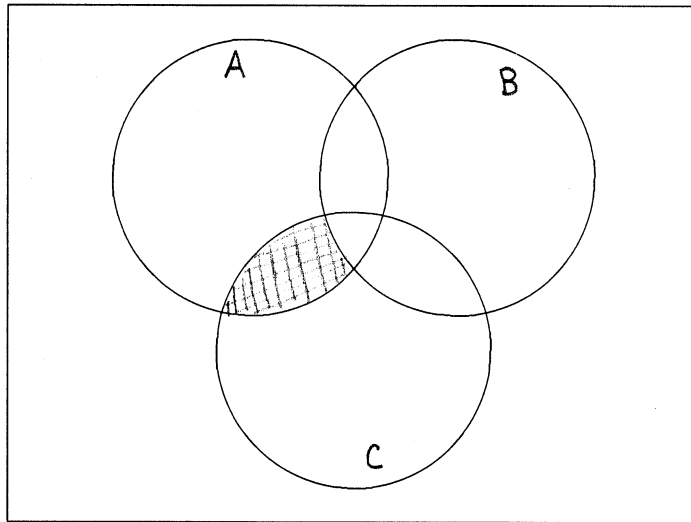
$$27 + 13 + 42 + 5 + 8 + 11 + 31 = 137$$

↖ OWNED AT LEAST ONE OF THESE CARS.
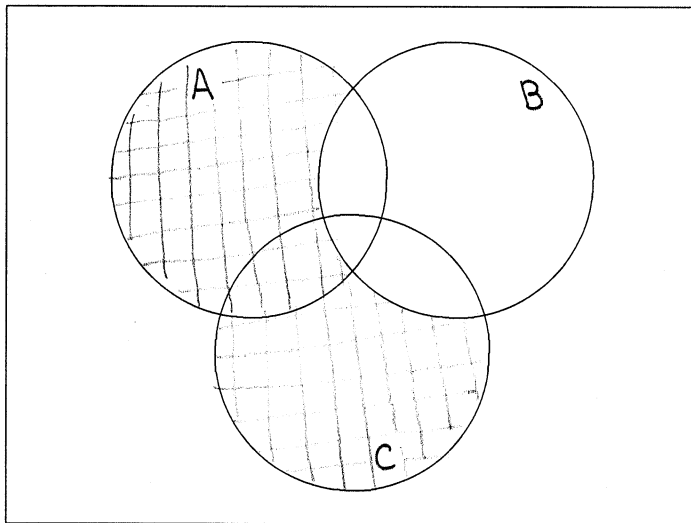
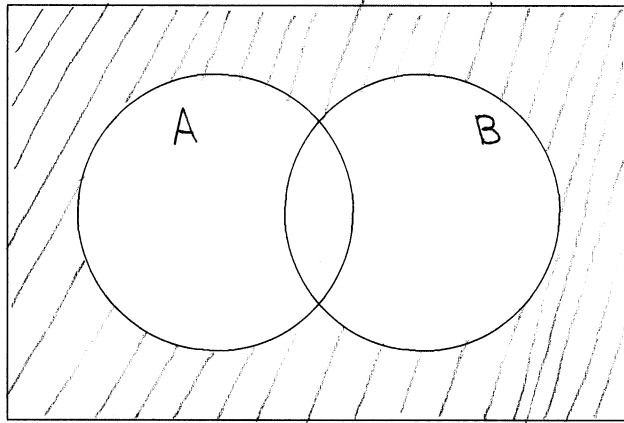$$160 - 137 = \boxed{23} \quad \text{OWNED NONE.}$$
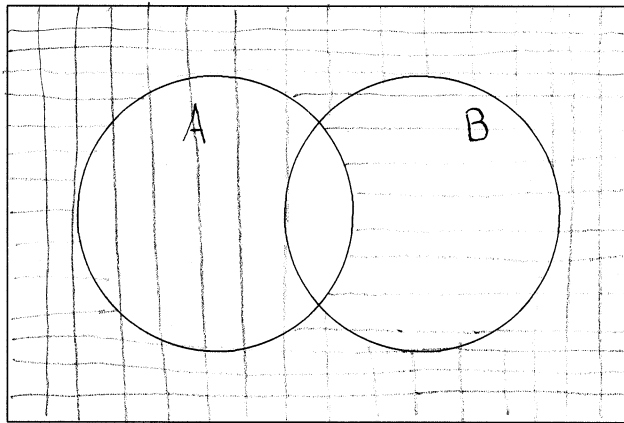
$(A-B) \cap C$

#1a

$\overline{B} \cap (A \cup C)$

#1b

$\overline{A \cup B}$

(EVERYTHING OUTSIDE
A OR B)

$\overline{A}$ SHADED HORIZONTALLY

$\overline{B}$ SHADED VERTICALLY

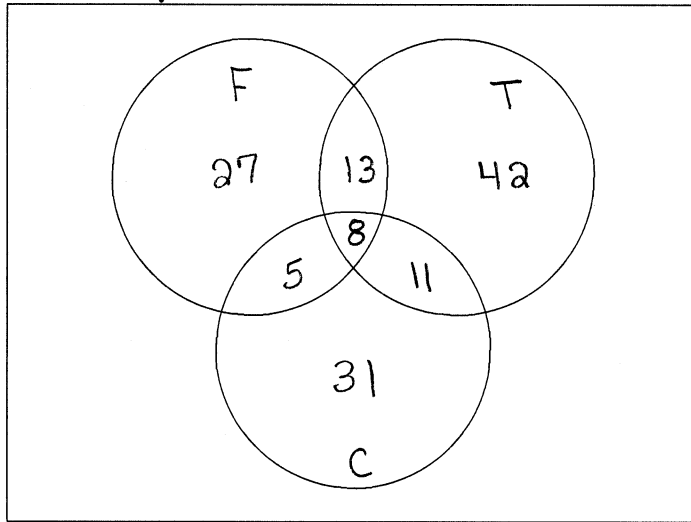$\overline{A} \cap \overline{B}$ SHADED ⊞
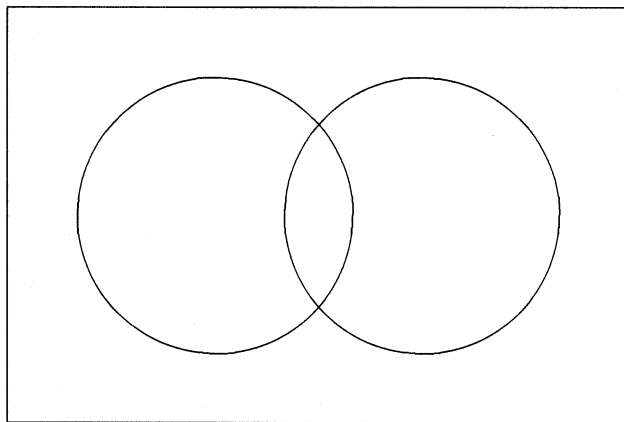
COMPARING,

WE SEE THAT

$\overline{A \cup B} = \overline{A} \cap \overline{B}$

#3

160

F = SET OF FORD
        OWNERS

T = SET OF TOYOTA
        OWNERS

C = SET OF
        CHEVROLET
            OWNERS.