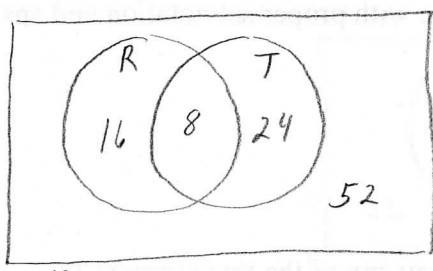# Lab for Sections 2.4
Use good notation and show appropriate work. Write the solutions to word problems in complete sentences.

1. A certain store has 100 bikes for sale. 24 of these bikes are red and 32 are ten-speed. 8 of the ten-speed bikes are red.

   (a) How many bikes are red or ten-speed?

   $n(R \cup T) = 16 + 8 + 24 = 48$ Forty-eight of the bikes are red or ten-speed.
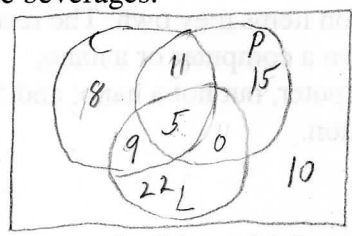
   (b) How many bikes are not red?

   $n(R') = 24 + 52 = 76$ Seventy-six bikes are not red.

   (c) How many bikes are red, but not ten-speed?

   $n(R - T) = 16$ Sixteen bikes are red, but not ten-speed.

   (d) How many bikes are not red or not ten-speed?

   $n(R' \cup T') = 24 + 52 + 16 = 92$ Ninety-two bikes are not red or not ten-speed.

   (e) How many bikes are neither red nor ten-speed?

   $n((R \cup T)') = 52$ Fifty-two bikes are neither red nor ten-speed.

2. In a survey of 80 people at a picnic, the following data were collected. 36 people drank lemonade; 33 people drank coffee; 31 people drank soda pop; 16 drank soda pop and coffee; 14 drank coffee and lemonade; everyone who drank both soda and lemonade also drank coffee, and only 5 people drank all three of these beverages.

   (a) How many people did not drink any of the three mentioned beverages?

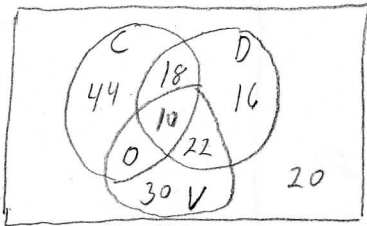 $n((C \cup P \cup L)') = 10$ Ten people did not drink any of the three beverages.

   (b) How many people did not drink coffee?

   $n(C') = 15 + 22 + 10 = 47$ Forty-seven people did not drink coffee.

   (c) How many people drank only lemonade?

   $n(L - (C \cup P)) = 22$ Twenty-two people drank only lemonade.

   (d) How many people drank coffee or soda pop?

   $n(C \cup P) = 8 + 11 + 15 + 9 + 5 + 0 = 48$ Forty-eight people drank coffee or soda pop.

   (e) How many people drank neither coffee nor lemonade?

   $n((C \cup L)') = 15 + 10 = 25$ Twenty-five people drank neither coffee nor lemonade.

3. In a survey of 160 students at MSUM, the following data were collected on where students bought their beverages: 72 said the Café Connection; 66 said the Dragon Stop; 62 said a vending machine; 32 said a vending machine and the Dragon Stop; 28 said the Dragon Stop and the Café Connection; everyone who said both a vending machine and the Café Connection also said the Dragon Stop, and only 10 people said all three of locations. Symbolize with proper set notation and answer each question.

(a) How many people did not say any of the three options?

$n((C \cup D \cup V)') = 20$ Twenty people did not say any of the three options.

(b) How many people did not say the Dragon Stop?

$n(D') = 44 + 0 + 30 + 20 = 94$ Ninety-four people did not say the Dragon Stop.

(c) How many people said only the Café Connection?

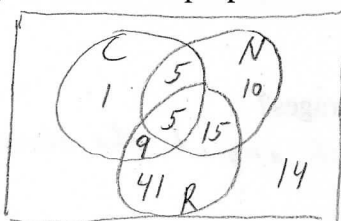$n(C - (V \cup D)) = 44$ Forty-four people said only the Café Connection.

(d) How many people said the Dragon Stop or a vending machine?

$n(D \cup V) = 18 + 16 + 10 + 22 + 0 + 30 = 96$ Ninety-six people said the Dragon Stop or a vending machine.

(e) How many people said neither the Dragon Stop nor the Café Connection?

$n((D \cup C)') = 30 + 20 = 50$ Fifty people said neither the Dragon Stop nor the Café Connection.

3. The results of a survey of 100 MSUM students living in a dorm on items they own. The results were: 20 own a computer; 35 own a nano; 70 own a refrigerator; 45 own a computer or a nano; 20 own a refrigerator and a nano; 9 own a refrigerator and a computer, but not a nano; and 5 own all three. Symbolize with proper set notation and answer each question.

$45 - (9 + 5 + 15) = 16$
$20 - (9 + 5) = 6$
$35 - (5 + 15) = 15$
$(6 + 15) - 16 = 5$

(a) How many students did not own any of the three items?

$n((C \cup N \cup R)') = 14$ Fourteen students did not own any of the three items.

(b) How many students own a refrigerator and a computer?

$n(R \cap C) = 9 + 5 = 14$ Fourteen students own a refrigerator and a computer.

(c) How many students own a nano or a refrigerator?

$n(N \cup R) = 5 + 10 + 5 + 15 + 9 + 41 = 85$ Eighty-five students own a nano or a refrigerator.