Directions: Complete each of the following problems. Make sure that you show the setup of each problem as needed.

I. Use a Venn diagram to answer the following question.

1. A survey of 80 college students was taken to determine the musical styles they listened to. Forty-two students listened to rock, 34 to classical, and 27 to jazz. Twelve students listened to rock and jazz, 14 to rock and classical, and 10 to classical and jazz. Seven students listened to all three musical styles.

Of those surveyed,

a. How many listened to only rock music? 23
b. How many listened to classical and jazz, but not rock? 3

c. How many listened to classical or jazz, but not rock? 32

d. How many listened to music in exactly one of the musical styles? 52

e. How many listened to music in at least two of the musical styles? 22

f. How many did not listen to any of the musical styles? 60

II. Solve each of the following problems.

2. How many different committees can be formed from 5 professors and 15 students if each committee is made up of 2 professors and 10 students?

\[ \binom{5}{2} \times \binom{15}{10} = 10 \times 3003 = 30030 \]

3. A club of ten members is to choose three officers – president, vice-president, and secretary-treasurer. If each office is to be held by one person and no person can hold more than one office, in how many ways can those offices be filled?

\[ \binom{10}{3} = 120 \]
4. A car model comes in nine colors, with or without air conditioning, with or without a sun roof, with or without automatic transmission, and with or without antilock brakes. In how many ways can the car be ordered with regard to these options?

\[ 9 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 144 \]

5. How many distinct permutations can be formed using the letters of the word TALLAHASSEE?

\[ \frac{11!}{3! \cdot 2! \cdot 2! \cdot 2!} = 1,663,200 \]

6. You volunteer to help drive children at a charity event to the zoo, but you can fit only 8 of the 17 children present in your van. How many different groups of 8 children can you drive?

\[ \binom{17}{8} = 24,310 \]