Chapel Hill Math Circle
Intermediate Group[1] (6-7)
March 19, 2016

1. Warmup: Prove that if 51 numbers are chosen from the integers between 1 and 100, inclusively, then at least 2 of them must be consecutive.

2. In Arizona, a group of 24 friends visited the Grand Canyon. Some spent their time white-water rafting, while the rest went down into the canyon either by foot or by mule or both.
    a. The number who went by both mule and foot was twice the number who went solely by foot.
    b. The number who went only by mule was the same as the number who went white-water rafting.
    c. The number who went by foot was half the total number of friends.

    How many went white-water rafting?

3. In Colorado, 24 students visited three sites in the area of Colorado Springs.
    a. Each student visited more than one site.
    b. The number who visited the Garden of the Gods was 7 times the number who visited exclusively both Pikes Peak and the Air Force Academy.
    c. The number who visited the Air Force Academy was twice the number who visited exclusively both Pikes Peak and the Garden of the Gods.
    d. The number who visited Pikes Peak was 5 times the number who visited exclusively both the Garden of the Gods and the Air Force Academy.

    How many visited all three sites?

4. In Ohio, a group of 24 students did physics experiments at an amusement park. All of them rode at least one of three roller coasters (designated X, Y, and Z).
    a. For each of these rides, the total number who rode was twice the number who rode only that ride.
    b. The sum of the number of students who rode only Y and only Z was 12.
    c. The sum of the number of students who rode only X and only Z was 11.
    d. The sum of the number of students who rode only X and only Y was 9.

    How many rode all three roller coasters?

[1] Some of these problems are taken from Mindware's *Venn Perplexors*.