

Worksheet 2.5 - Math 455

1. A noted vexillologist (Sheldon Cooper) tells you that 30 of the 50 US state flags have blue as a background color, twelve have stripes, 26 exhibit a plant or animal, nine have both blue in the background and stripes, 23 have both blue in the background and feature a plant or animal, and three have both stripes and a plant or animal. One of the flags in this last category (California) does not have any blue in the background. How many state flags have no blue in the background, and no stripes or animal featured.
2. Suppose 50 socks lie in a drawer. Each one is either white or black, ankle-high or knee-high, and either has a hole or doesn't. 22 socks are white, four of these have a hole, and one of these four is knee-high. Ten white socks are knee-high, ten black socks are knee-high, and five-knee-high socks have a hole. Exactly three ankle-high socks have a hole. Use the principle of inclusion-exclusion to determine the number of black, ankle-high socks with no holes.
3. Use the principle of inclusion-exclusion to determine the number of five-card hands drawn from a standard deck that contain at least one card from each of the four suits.

Hints:

1. Draw a Venn diagram.
2. Draw a Venn diagram.
3. The number of five-card hands that contain at least one card from each of the four suit is equal to the the total number of five-card hands minus the number of hands that do not contain all four suits. Maybe you're missing hearts? How many hands don't have any hearts? How many hands are missing spades? How many hands are missing both hearts and spades?