# 1

1. Product Rule.
2. Mutually exclusive
3. Ordered
4. If there are boxes and you place objects into them, then at least one box will contain at least objects.
5. sample space.
6. equally likely,

# 2

1. 151200 ways
2. 90720 ways
3. ways
4. ways
5. ways

# 3



# 4

Then, by the pigeon hole principle, there will be at least identical numbers.

2. Indeterminate using the pigeon hole principle.

# 5



# 6

1. =249900 ways
3. There are only 13 diamond cards in the 52-cards deck, and the poker game has 5 cards. So there are ways.
4. Same as part b, , 65780 ways.
5. Same as part b, , 65780 ways.

# 7



# 8

1. is not reflexive since
2. is symmetric since
3. is not transitive since
4. means if a has chatted with b, and b has chatted with c, then a has chatted with c (transitive).

# 9

1. is reflexive since
2. is not symmetric since
3. is antisymmetric since
4. is transitive since
5. , in this case, means if and , then