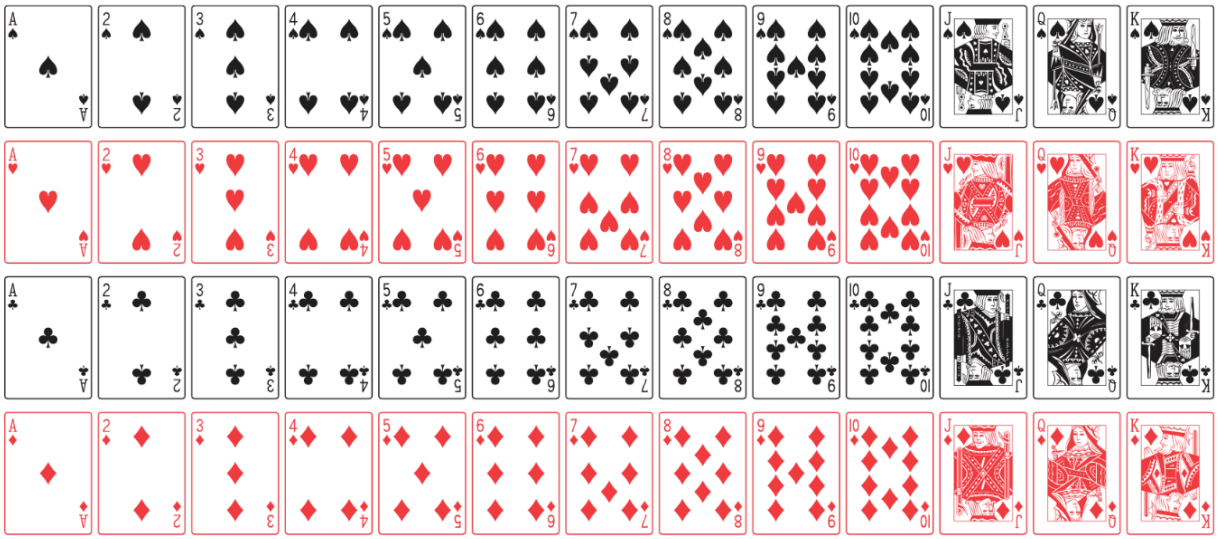
Consider a standard deck of 52 cards, as displayed in the following figure. In the first and third rows all cards are black; in the second and fourth rows, all cards are red.



Consider the following events when a card is randomly selected.

- A: card selected is a heart.
- B: card selected is the color black.
- C: card selected is a face card (i.e. J, Q, K)
- D: card selected is a King.

1. Find $P(A)$.

2. Find $P(C)$.

3. Find $P\left(D^C\right)$.

4. Find $P(A \cup B)$.

Consider the seven sided die (with sides 0, 1, 2, 3, 4, 5 and 6) from your reading questions. You roll this die once. Let:

- A be the event that a given roll yields an even number.
- B be the event that a given roll is greater than or equal to three.
- C be the event that the number appears in the phrase "Stat 20".

5. Find $\mathrm{P}(A)$, $\mathrm{P}(B)$ and $\mathrm{P}(C)$

6. Find $\mathrm{P}(B \cap C)$

7. Find $\mathrm{P}\left(A \cap B^C\right)$.

One number will be drawn at random from each of the two sets below:

$A = \{1, 2, 3\}$; $B = \{1, 2, 3, 4\}$

8. What is the probability the number drawn from A is greater than the one drawn from B?

9. What is the probability that the number drawn from A is equal to the one drawn from B?

Consider an outcome space Ω with events A, B that are *not* mutually exclusive. Let $P(A) = 0.5$, $P(B) = 0.7$ and $P(A \cap B) = .4$.

10. Draw a Venn Diagram containing two circles, one representing A and the other B.

11. Shade in the space in the diagram above corresponding to event A.

12. Shade in the space in the diagram above corresponding to event B in a way that is different than the way you shaded in the space for event A.

13. Based on your shading, calculate the probability $P(A \cup B)$. Explain why you cannot add $P(A)$ and $P(B)$ directly to obtain this answer.