

**A.P. Statistics**  
**Assignment 4.6**

**Remember to show your thinking through your work.**

1) For each of the following, assume you are working with a standard deck of 52 cards. There are 13 cards (2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King, and Ace) in each of four suits (Clubs, Diamonds, Hearts, and Spades).

a) What is the  $P(\text{Club})$  when drawing one card.

b) What is the  $P(\text{Jack})$  when drawing one card.

c) What is the  $P(\text{Jack} \cap \text{Club})$  when drawing one card.

d) What is the  $P(\text{Jack} \cup \text{Club})$  when drawing one card.

e) What is the  $P(\text{Jack} | \text{Face Card})$  when drawing one card. This roughly translates to what is the probability of getting a Jack if you know the card is a face card.

f) What is the  $P(\text{Red} | \text{Heart})$  when drawing one card.

2) Choose an employed person at random. Let A be the event that the person is female and B be the event that the person holds a managerial position. Data from the U.S. Department of Labor suggests that  $P(A) = 0.47$  and  $P(B|A) = 0.34$ .

a) Explain what  $P(A) = 0.47$  means in context.

- b) Explain what  $P(B|A) = 0.34$  means in context.
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- c) What is the probability that a randomly chosen employed person is a male?
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- d) What is the probability that a randomly chosen employed person is a female manager?
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- e) What is the probability that a randomly chosen employed female is not a manager?
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- 3) Back to the cards! In poker, a flush is when all five cards are the same suit. Find the probability of being dealt a flush (when being dealt five cards).
- a) Start by just considering clubs. What is the probability that the first card dealt is a club?
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- b) What is the probability that the second card dealt is a club given that the first one was a club?
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- c) What is the probability that the third card dealt is a club given that the first two were clubs?
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- d) What is the probability that the fourth card dealt is a club given that the first three were clubs?
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- e) What is the probability that the fifth card dealt is a club given that the first four were clubs?

- f) The probability of being dealt all five clubs is the product of the above probabilities. Why is this true and what is this probability?

- g) You have now found the probability of being dealt a flush in clubs. This is the same as the probability of being dealt a flush in diamonds, hearts, or spades. Then, what is the probability of being dealt a flush?

- 4) You have a torn tendon and are facing arthroscopic surgery to fix it. The surgeon explains the risks of the surgery. Infection occurs in 2% of all cases and the repair fails in 11% of the cases. 0.5% of the time the repair fails and infection occurs. What is the probability that the operation is successful and infection-free?
- 5) The following table depicts the Nobel Prize winners in some categories by country from 1901 to 1998. Use this table to answer the questions that follow.

<b>Country</b>	<b>Chemistry</b>	<b>Medicine</b>	<b>Physics</b>
<b>France</b>	11	7	25
<b>Germany</b>	17	29	61
<b>Japan</b>	3	1	4
<b>Soviet Union</b>	7	1	10
<b>United Kingdom</b>	26	24	21
<b>United States</b>	46	82	70

- a) If a winner is chosen at random, what is the probability that he or she won their award in physics?

- b) If a winner is chosen at random, what is the probability that he or she is from France?

- c) If a winner is chosen at random, what is the probability that he or she is from the United States given that the award was won in the field of medicine?

- d) If a winner is chosen at random, what is the probability that he or she won in the field of medicine given that he or she was from the United States?

- e) If a winner is chosen at random, what is the probability that he or she won the award in physics or chemistry given that he or she is from the Soviet Union?