

# BASIC PROBABILITY HOMEWORK

TEXT: 3.1, 3.4

LAST NAME	FIRST NAME	DATE
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In a particular college, there are some Math and some English students. Some students drive a car to school and others ride a bike. Write the formal descriptions for the probabilities of the events described below. Note that you cannot find numerical answers here. For example, “the probability that a student majors in Math” can be formally stated as  $P(M)$ .

Let  $M$  be the event that a student majors in Math.

Let  $E$  be the event that a student majors in English.

Let  $C$  be the event that a student drives a car to school.

Let  $B$  be the event that a student rides a bike to school.

1. The probability that a student majors in English.
2. The probability that a student majors in Math or drives a car.
3. The probability that a student rides a bike and majors in English.
4. The probability that a student does not ride a bike.
5. The probability that a student drives a car, and does not major in Math.
6. The probability that a student does not major in English, or does not ride a bike.

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The experiment is to draw one card at random out of a well-shuffled **standard 52-card deck**.

7. What are the chances the card is a diamond suit?
8. What are the chances the card is an Ace?

Select one piece at random out of the 32 pieces used in the standard chess game.

9. What are the chances the piece is a black Knight?

10. How likely is the piece to be a King or a Queen of either color?

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Use the following information to answer the following exercises. There are 23 countries in North America, 12 countries in South America, 47 countries in Europe, 44 countries in Asia, 54 countries in Africa, and 14 in Oceania (Pacific Ocean region). The experiment is to pick one country at random.

Let  $N$  = the event that a country is in North America.

Let  $M$  = the event that a country is in South America.

Let  $E$  = the event that a country is in Europe.

Let  $A$  = the event that a country is in Asia.

Let  $F$  = the event that a country is in Africa.

Let  $O$  = the event that a country is in Oceania.

11. Find the size of the sample space.

15. Find  $P(O \cup M)$

12. Find  $P(A)$

16. Find  $P(M \cup N)$

13. Find  $P(F)$

17. Find  $P(E')$

14. Find  $P(F')$

18. Find  $P(O \cap A)$

The table below shows a random sample of musicians and how they learned to play their instruments. The experiment is to choose one of these musicians at random. Use the provided data to answer the following questions.

<b>Gender</b>	<b>Self-taught</b>	<b>Studied in School</b>	<b>Private Instruction</b>	<b>Total</b>
<b>Female</b>	12	38	22	72
<b>Male</b>	19	24	15	58
<b>Total</b>	31	62	37	130

19. Find  $P(\text{musician is a female})$ .

20. Find  $P(\text{musician is self-taught})$ .

21. Find  $P(\text{musician is a male who studied in school})$

22. Find  $P(\text{musician is a female or had private instruction})$

23. Are the events *Self-taught* and *Female* mutually exclusive? Why or why not?

24. Are the events *Studied in school* and *Private instruction* mutually exclusive? Explain.

Use the information in the table below to answer the following exercises. The table shows the political party affiliation of each of 67 members of the US Senate in June 2012, and when they are up for reelection. The experiment is to choose one senator at random.

<b>Up for reelection</b>	<b>Democratic Party</b>	<b>Republican Party</b>	<b>Other</b>
<b>November 2014</b>	20	13	0
<b>November 2016</b>	10	24	0

25. What is the probability that the senator has “Other” affiliation?
  
  
  
  
  
  
  
  
  
  
26. What is the probability that the senator is up for reelection in November 2016?
  
  
  
  
  
  
  
  
  
  
27. What are the chances that the senator is a Republican or is up for reelection in 2014?
  
  
  
  
  
  
  
  
  
  
28. What are the chances that the senator is a Democrat and is up for reelection in 2016?
  
  
  
  
  
  
  
  
  
  
29. Are the events *Other* and *November 2014* mutually exclusive? Explain.
  
  
  
  
  
  
  
  
  
  
30. Are the events *Democratic Party* and *November 2014* mutually exclusive? Why or why not?

The table below identifies a group of children by one of four hair colors, and by type of hair. The experiment consists in choosing one of these children at random. Use this information to answer the following questions.

Hair Type	Brown	Blond	Black	Red	Totals
Wavy	20		15	3	43
Straight	80	15		12	
Totals		20			215

Complete the table above. (The frequencies should add up to the corresponding totals.)

31. What is the probability that the child will have wavy hair?

32. What is the probability that the child will have either brown or blond hair?

33. What is the probability that the child will have wavy brown hair?

34. What is the probability that the child will not have brown hair?

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35. Circle those and only those numbers that represent probabilities.

$\frac{9}{19}$      $-0.001$      $\frac{19}{20}$      $\frac{17}{16}$      $0.008$      $-0.5$      $1.5$      $4\%$

## ANSWERS

1.  $P(E)$
2.  $P(M \cup C)$
3.  $P(B \cap E)$
4.  $P(B')$
5.  $P(C \cap M')$
6.  $P(E' \cup B')$
7. 0.25
9. 0.0625
11. 194
13. 0.2783505
15. 0.1340206
17. 0.757732
19. 0.5538462
21. 0.1846154
23. They are not mutually exclusive because they have 12 outcomes in common.
25. 0
27. 0.8507463
29. They are mutually exclusive because they have zero outcomes in common.
31. 0.2
33. 0.09302326
35.  $9/19$ ,  $19/20$ , 0.008, 4%