Chapter 4 Probability
Practice 4
STA2023, Broward College Answers by c sotuyo @ imathesis.com

Answer the question.

1) On a multiple choice test with four possible answers (like this question), what is the probability of answering a question correctly if you make a random guess? 1) C

A) 1 B) $\frac{3}{4}$ C) $\frac{1}{4}$ D) $\frac{1}{2}$

There are 4 equally likely choices, only one is correct: 1/4

Find the indicated probability.

2) A die with 12 sides is rolled. What is the probability of rolling a number less than 11? 2) A

A) $\frac{5}{6}$ B) $\frac{1}{12}$ C) 10 D) $\frac{11}{12}$

A peculiar die of 12 sides, there are 10 numbers less than 11; probability is 10/12 which simplifies to 5/6.

3) Two 6-sided dice are rolled. What is the probability that the sum of the two numbers on the dice will be 3? 3) D

A) $\frac{1}{2}$ B) $\frac{17}{18}$ C) 2 D) $\frac{1}{18}$

By rolling two dice of six sides there are 36 possible pairs; of those, only 1 on the first die and 2 on the second die, and 2 on the first die and 1 on the second add up to 3: 2/36 = 1/18

Answer the question, considering an event to be "unusual" if its probability is less than or equal to 0.05.

4) Is it "unusual" to get a 12 when a pair of dice is rolled? 4) A

A) Yes B) No

There are 36 possible pairs when we roll two dice: only one, 6 on both dice add up to 12. Prob = 1/36 apprx 0.027 which is less than 0.05, therefore it is an unusual event.

Answer the question.

5) Find the odds against correctly guessing the answer to a multiple choice question with 3 possible answers. 5) B

A) 3 : 1 B) 2 : 1 C) 3 : 2 D) 2 : 3

Out of the three possible answers two are incorrect or "against" guessing the correct one: 2:1

Find the indicated complement.

6) Find $P(\overline{A})$, given that P(A) = 0.956. 6) D

A) 0.004 B) -0.044 C) 1 D) 0.044

Given P(A) = 0.956, P(no A) or A complement is 1 - 0.956 = 0.044

7) The probability that Luis will pass his statistics test is 0.67. Find the probability that he will fail his statistics test. 7) A

A) 0.33 B) 2.03 C) 1.49 D) 0.34

P(fail) = 1 - 0.67 = 0.33

Find the indicated probability.

8) A spinner has equal regions numbered 1 through 15. What is the probability that the spinner will stop on an even number or a multiple of 3? 8) A

A) $\frac{2}{3}$ B) 12 C) $\frac{7}{9}$ D) $\frac{1}{3}$

P(A or B) = P(A) + P(B) - P(A and B) It follows that P(A), "even number" is 7/15 since 7 of the whole number from 1 to 15 are even; P(B), "multiples of 3" there are 5 (3, 6, 9, 12, 15); therefore, P(B) =5/15; while P(A and B) --numbers that are at the same time even and multiples of 3, there are 2: 6 and 12. Then, P(A or B) = 7/15 + 5/15 - 2/15 = 10/15 =2/3

9) If you pick a card at random from a well shuffled deck, what is the probability that you get a face card or a spade? 9) A

A) $\frac{11}{26}$ B) $\frac{9}{26}$ C) $\frac{25}{52}$ D) $\frac{1}{22}$

P(A or B) = P(A) + P(B) - P(A and B); event A is "choosing a face card"; B, "choosing a spade"; There are 12 face cards, 13 spades and 3 of the spades are face cards: P(A or B) = 12/52 + 13/52 -3/52 = 22/52 = 11/26

#10: Create a Table:

	Male	Fem	Total
Yes	12	42	54
No	12	34	46

10) Of the 54 people who answered "yes" to a question, 12 were male. Of the 46 people that answered "no" to the question, 12 were male. If one person is selected at random from the group, what is the probability that the person answered "yes" or was male? 10) A

A) 0.66 B) 0.24 C) 0.222 D) 0.78

P(A or B) = P(A) + P(B) - P(A and B) ; Event A is "yes"; event B is "male": P(A or B) = 54/100 + 24/100 - 12/100 = 66/100 = 0.66

11) A 6-sided die is rolled. Find P(3 or 5). 11) C

A) $\frac{1}{6}$ B) 2 C) $\frac{1}{3}$ D) $\frac{1}{36}$

P(A or B) = P(A) + P(B) - P(A and B) ; Event A is getting a 3; event B is getting a 5. Events are mutually exclusive, we cannot get a 3 and a 5 at the same time; therefore, P(A or B) = 1/6 + 1/6 = 2/6 =1/3

12) A card is drawn from a well-shuffled deck of 52 cards. Find P(drawing an ace or a 9). 12) C

A) $\frac{5}{13}$ B) $\frac{13}{2}$ C) $\frac{2}{13}$ D) 10

P(A or B) = P(A) + P(B) - P(A and B) ; Event A is drawing an Ace; event B is drawing a 9. Events are mutually exclusive, we cannot get an Ace and a 9 at the same time; therefore, P(A or B) = 4/52 + 4/52 = 8/52 =2/13

13) The table below describes the smoking habits of a group of asthma sufferers. 13) C

	Nonsmoker	Occasional smoker	Regular smoker	Heavy smoker	Total
Men	367	50	65	47	529
Women	316	31	70	45	462
Total	683	81	135	92	991

If one of the 991 people is randomly selected, find the probability of getting a regular or heavy smoker.

A) 0.136 B) 0.493 C) 0.229 D) 0.113

P(A or B) = P(A) + P(B) - P(A and B) ; Event A is choosing a regular smoker; event B is choosing a heavy smoker. Events are mutually exclusive, people who are classified as regular cannot be classified as heavy smoker: P(A or B) = 135/991 + 92/991 = 0.2291

14) A bag contains 8 red marbles, 4 blue marbles, and 1 green marble. Find P(not blue). 14) C

A) 9 B) $\frac{4}{13}$ C) $\frac{9}{13}$ D) $\frac{13}{9}$

P(not blue) = 9/13

15) In one town, 45% of all voters are Democrats. If two voters are randomly selected for a survey, find the probability that they are both Democrats. Round to the nearest thousandth if necessary. 15) C

A) 0.900 B) 0.198 C) 0.203 D) 0.450

This is not an "OR"situation; these is a sequence of events, "AND" situation, since events are independent: event A, selecting the first voter and he/she is a democrat; event B, selecting a 2nd voter and He/She is also a democrat: P(A and B) = P(A) * P(B) = 0.45 * 0.45 = 0.2025 apprx = 0.203.

16) Find the probability of correctly answering the first 5 questions on a multiple choice test if random guesses are made and each question has 4 possible answers. 16) B

A) $\frac{4}{5}$ B) $\frac{1}{1024}$ C) $\frac{1}{625}$ D) $\frac{5}{4}$

Again, a sequence of events; guesses are at random and independent, and since the prob of being correct is 1/4 for each question; the prob of being correct in s sequence of five questions is equal to multiply 1/4 * 1/4 *1/4 * 1/4 * 1/4 which is = (1/4)^5 = 1/1024.

17) A manufacturing process has a 70% yield, meaning that 70% of the products are acceptable and 30% are defective. If three of the products are randomly selected, find the probability that all of them are acceptable. 17) C

A) 0.027 B) 2.1 C) 0.343 D) 0.429

A sequence of three independent events; the prob of each event is 0.70; the answer is 0.70 * 0.70 * 0.70 = (0.70)^3 = 0.343

18) You are dealt two cards successively (without replacement) from a shuffled deck of 52 playing cards. Find the probability that both cards are black. Express your answer as a simplified fraction. 18) D

A) $\frac{1}{2{,}652}$ B) $\frac{13}{51}$ C) $\frac{25}{51}$ D) $\frac{25}{102}$

Choosing two cards, --this is a sequence of two events; this time, events are not independent since when we choose the first card, it is not replaced back into the deck of 52 cards; therefore, when we pick the second card there is one black card less and less card in total: P(A and B) = P(A) * P(B|A) = 26/52 * 25/51 = 25/102

19) You are dealt two cards successively (without replacement) from a shuffled deck of 52 playing cards. Find the probability that the first card is a King and the second card is a queen. Express your answer as a simplified fraction. 19) C

A) $\frac{1}{663}$ B) $\frac{13}{102}$ C) $\frac{4}{663}$ D) $\frac{2}{13}$

Same situation as #18, vents are not independent since the first card is not put back into the deck:
P(A and B) = P(A) * P(B|A) = 4/52 * 4/51 = 4/663

20) The table below describes the smoking habits of a group of asthma sufferers. 20) A

	Nonsmoker	Light smoker	Heavy smoker	Total
Men	303	35	37	375
Women	413	31	45	489
Total	716	66	82	864

#20: Two consecutive events: selecting a heavy smoker, event A; and selecting another heavy smoker, event B. We assume "without replacement" since when we select someone from a group, that person is not returned back into the group; therefore, P(A and B) = P(A) * P(B|A) = 82/864 * 81/863 = 0.0089078

If two different people are randomly selected from the 864 subjects, find the probability that they are both heavy smokers. Round to six decimal places.

A) 0.008908 B) 0.001834 C) 0.0001487 D) 0.009007

Find the indicated probability. Round to the nearest thousandth.

21) An unprepared student makes random guesses for the ten true-false questions on a quiz. Find the probability that there is at least one correct answer. 21) C

A) 0.001 B) 0.900 C) 0.999 D) 0.100

True/False, P(correct) = P(wrong or incorrect) = 1/2. P(at least one correct) = 1 - P(no correct or all wrong) = 1 - (1/2)^10 = 0.999

22) A study conducted at a certain college shows that 56% of the school's graduates find a job in their chosen field within a year after graduation. Find the probability that among 6 randomly selected graduates, at least one finds a job in his or her chosen field within a year of graduating. 22) D

A) 0.167 B) 0.560 C) 0.969 D) 0.993

P(find a job) = 0.56 ; P(do not find a job) = 1- 0.56 = 0.44 P(at least one finds a job) = 1 - P(no one finds a job) = 1 - (0.44)^6 = 0.99274

23) In a batch of thousands of clock radios 7% are defective. A sample of 5 clock radios is randomly selected and tested. The entire batch will be rejected if at least one of those tested is defective. What is the probability that the entire batch will be rejected? 23) A

A) 0.304 B) 0.0700 C) 0.200 D) 0.696

P(defective) = 0.07; P(no defective) = 0.93 P(at least one defective) = 1 - P (none defective) = 1 - (0.93)^5 = 0.3043

Find the indicated probability. Express your answer as a simplified fraction unless otherwise noted.

24) The table below shows the soft drinks preferences of people in three age groups. 24)

	cola	root beer	lemon-lime
under 21 years of age	40	25	20
between 21 and 40	35	20	30
over 40 years of age	20	30	35

If one of the 255 subjects is randomly selected, find the probability that the person is over 40 years of age.

A) $\frac{1}{3}$ B) $\frac{1}{2}$ C) $\frac{3}{5}$ D) $\frac{2}{5}$

Total of subjects over 40 = 85. Grand total, 255; P(over 40) = 85/255 = 1/3.

25) The table below shows the soft drinks preferences of people in three age groups. 25) C

	cola	root beer	lemon-lime
under 21 years of age	40	25	20
between 21 and 40	35	20	30
over 40 years of age	20	30	35

#25: The intersection of "over 40 and drinks cola" is 20.
Therefore, P(over 40 and drinks cola) = 20/255 = 4/51.

If one of the 255 subjects is randomly selected, find the probability that the person is over 40 and drinks cola.

A) $\frac{4}{19}$ B) $\frac{4}{17}$

C) $\frac{4}{51}$ D) None of the above is correct.

26) The table below describes the smoking habits of a group of asthma sufferers. 26) C

	Nonsmoker	Light smoker	Heavy smoker	Total
Men	358	71	69	498
Women	304	78	76	458
Total	662	149	145	956

#26. Event A is selecting a nonsmoker; B, "the subject is a woman". Given that is a condition, the formula is: P(A|B) = P(A and B)/P(B); identify P(A and B) as prob of the subject being nonsmoker and woman at the same time, that is 304/956; P(B)=P(woman) = 458/956; dividing the two fractions, clears the denominator, 956, it simplifies to P(nonsmoker|woman) = 304/458 = 0.6637
Notice that we divide by the total of the "given that" which in this case is 458, women; among women, (since we were given that condition) there are 304 nonsmokers, that is 304/458 = 0.6637.

If one of the 956 subjects is randomly selected, find the probability that the person chosen is a nonsmoker given that it is a woman. Round to the nearest thousandth.

A) 0.459 B) 0.318 C) 0.664 D) 0.379

27) The table below shows the soft drinks preferences of people in three age groups. 27) C

	cola	root beer	lemon-lime
under 21 years of age	40	25	20
between 21 and 40	35	20	30
over 40 years of age	20	30	35

#27: P(drinks root beer|subject is over 40) = 30/85 = 6/17.
The total of "over 40" is 85, among them, 30 drink root beer.

If one of the 255 subjects is randomly selected, find the probability that the person drinks root beer given that they are over 40.

A) $\frac{2}{17}$ B) $\frac{2}{5}$

C) $\frac{6}{17}$ D) None of the above is correct.

Solve the problem.

28) The library is to be given 5 books as a gift. The books will be selected from a list of 20 titles. If each book selected must have a different title, how many possible selections are there? 28) B

A) 1,860,480 B) 15,504 C) 100 D) 3,200,000

Combinations or permutations? Combinations, since the order in which the books are received is irrelevant: 20 nCr 5 = 15504

29) How many ways can an IRS auditor select 6 of 13 tax returns for an audit? 29) C

A) 1,235,520 B) 720 C) 1716 D) 4,826,809

Again, combinations: the order in which the auditor selects the tax returns is irrelevant: 13 nCr 6 = 1716.

30) A state lottery involves the random selection of six different numbers between 1 and 26. If you select one six number combination, what is the probability that it will be the winning combination? 30) A

A) $\frac{1}{230,230}$ B) $\frac{1}{720}$ C) $\frac{1}{308,915,776}$ D) $\frac{1}{165,765,600}$

Combinations: as long as the winner chooses the right numbers, the order is irrelevant: 26 nCr 6 = 230230; only one of the combinations wins; therefore, the probability of winning is = 1/230230

31) There are 10 members on a board of directors. If they must form a subcommittee of 6 members, how many different subcommittees are possible? 31) A

A) 210 B) 720 C) 1,000,000 D) 151,200

This is a combination problem since no "ranks" are being assigned among the members of the committee, again, order in each possible subgroup (subcommittee) is irrelevant: 10 nCr 6 = 210.

32) A state lottery involves the random selection of six different numbers between 1 and 31. If you select one six number combination, what is the probability that it will be the winning combination? 32) C

A) $\frac{1}{887{,}503{,}681}$ B) $\frac{1}{530{,}122{,}320}$ C) $\frac{1}{736{,}281}$ D) $\frac{1}{720}$

Lottery ticket consists of a selection from a set without regard to order; that is, it is a combination problem: 31 nCr 6 = 736281. Only one combination wins: P(winning) = 1/736281

33) How many 3-digit numbers can be formed using the digits 1, 2, 3, 4, 5, 6, 7 if repetition of digits is not allowed? 33) D

A) 5 B) 343 C) 6 D) 210

Forming 3-digits numbers the order matters, since 123 is not the same as, say, 321 or 213 etc. This is a permutation problem: 7 nPr 3 = 210.

34) How many ways can 6 people be chosen and arranged in a straight line if there are 8 people to choose from? 34) B

A) 48 B) 20,160 C) 720 D) 40,320

Order matters; arrangements always implies "order": 8 nPr 6 = 20160.

35) A musician plans to perform 4 selections. In how many ways can she arrange the musical selections? 35) B

A) 4 B) 24 C) 120 D) 16

As stated above, arrangements always implies "order": 4 nPr 4 = 24. Notice that when we arrange n items out of n items, nPn = n! In this question we may simple find 4! = 24.

36) There are 9 members on a board of directors. If they must elect a chairperson, a secretary, and a treasurer, how many different slates of candidates are possible? 36) C

A) 729 B) 84 C) 504 D) 362,880

Since in this situation ranks are being assigned, the order matters. There are 3 positions being assigned: chairperson, secretary, treasurer: 9 nPr 3 = 504.