

Homework #4

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Provide an appropriate response.

- 1) You have flipped a coin 5 times in a row and gotten heads on each flip. What is your next flip most likely to be and why? 1) _____
- A) Heads because the probability of heads is 1 based on the first 5 throws
 - B) Heads because the coin is obviously not balanced
 - C) Either heads or tails, the probability of heads (tails) remains constant from one flip to the next
 - D) Tails since the probability of 5 tails in 10 throws is 50% so the next five throws are likely to be tails
 - E) Tails because the probability of six heads in a row is very small
- 2) Both parents are carriers for an inheritable trait so that the probability their child possesses the trait is 25%. Given that the couple has 4 children, which of the following is true? 2) _____
- A) Exactly one of the children must possess the trait
 - B) It is possible that none of the four children possess the trait
 - C) At least two of the children must possess the trait
 - D) It is impossible that all four children possess the trait
- 3) You play a game where you are to guess under which of 4 cups a coin has been placed. How many times would you expect to guess correctly in 20 plays of the game? Note that the coin is moved after each play. 3) _____
- A) 4 B) 5 C) 1 D) 10

Answer true or false.

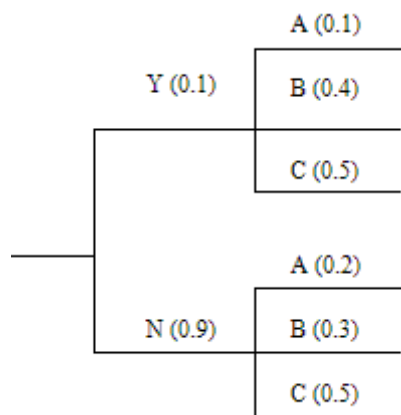
- 4) Two trials are independent if they have no outcomes in common. 4) _____
- A) False B) True

Provide an appropriate response.

- 5) A prix fixed menu offers a choice of 2 appetizers, 4 main courses and 3 desserts. If a tree diagram is used to list all possible meal combinations from the prix fixed menu, how many branches will there be? 5) _____
- A) 12
 - B) 9
 - C) 24
 - D) 8
 - E) none of these

6) Suppose the following tree diagram summarizes the responses of 500 people to two questions, where the first response is either yes or no and the second is multiple choice with three possible answers (A, B or C). Use the tree diagram to calculate the probability that a person answered YB (yes, B).

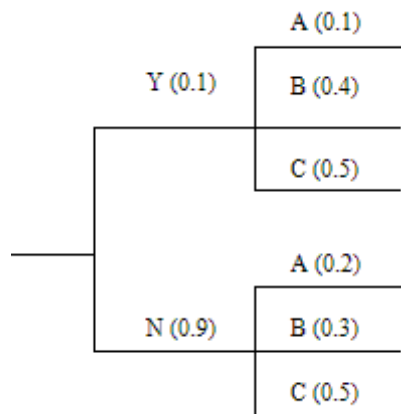
6) _____



- A) 0.7 B) 0.07 C) 0.5 D) 0.04 E) 0.4

7) Suppose the following tree diagram summarizes the responses of 500 people to two questions, where the first response is either yes or no and the second is multiple choice with three possible answers (A, B or C). Use the tree diagram to calculate the probability that a person answered B to the multiple choice question.

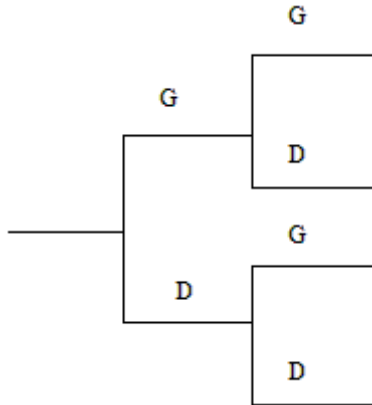
7) _____



- A) 0.31 B) 0.7 C) 0.07 D) 0.4 E) 0.04

8) A sample of two light bulbs is selected in succession, without replacement, from among 6 good ones and 4 defective ones. List the probabilities corresponding to the four branches (GG, GD, DG, DD).

8) _____



- A) 0.33, 0.24, 0.24, 0.13
 C) 0.3, 0.24, 0.24, 0.12

- B) 0.36, 0.24, 0.24, 0.16
 D) 0.33, 0.27, 0.27, 0.13

9) Identify the sample space for the following probability experiment: recording the number of days it snowed in Cleveland in the month of January.

9) _____

- A) {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, . . . , 30, 31}
 B) {30, 21}
 C) {0, 1}
 D) {0, 1, 2, 3}
 E) {0, 1, 2, 3, . . . , 12}

10) A student is taking two pass/fail courses over the summer break. What is the sample space for the student's grades?

10) _____

- A) {PP, PF, FP, FF} B) {PP, PF, FF} C) {P, F} D) {P, P, F, F}

List the outcomes comprising the specified event.

11) When a quarter is tossed four times, 16 outcomes are possible.

11) _____

HHHH	HHHT	HHTH	HHTT
HHTH	HTHT	HTTH	HTTT
THHH	THHT	THTH	THTT
TTHH	TTHT	TTTH	TTTT

Here, for example, HHTH represents the outcome that the first toss is heads, the next two tosses are tails, and the fourth toss is heads. List the outcomes that comprise the event of tossing exactly three tails.

- A) HTTT, THTT, TTHT, TTTH
 B) TTTT
 C) HTTT, THTT, TTHT, TTTH, TTTT
 D) HTTT, THTT, TTTH
 E) THTT, TTHT, TTTH

12) When a quarter is tossed four times, 16 outcomes are possible.

12) _____

HHHH	HHHT	HHTH	HHTT
HTHH	HTHT	HTTH	HTTT
THHH	THHT	THTH	THTT
TTHH	TTHT	TTTH	TTTT

Here, for example, HTTH represents the outcome that the first toss is heads, the next two tosses are tails, and the fourth toss is heads. List the outcomes that comprise the event of obtaining the same face on the first three tosses.

- A) HHHH, TTTT
- B) HHHT, TTTH, HTTT, THHH
- C) HHH, TTT
- D) HHHH, HHHT, TTTH, TTTT
- E) HHHT, TTTH

13) Three board members for a nonprofit organization will be selected from a group of five people. The board members will be selected by drawing names from a hat. The names of the five possible board members are Allison, Bob, Charlie, Dave, and Emily. The possible outcomes can be represented as follows.

13) _____

ABC	ABD	ABE	ACD	ACE
ADE	BCD	BCE	BDE	CDE

Here, for example, ABC represents the outcome that Allison, Bob, and Charlie are selected to be on the board. Let A = event that Bob and Dave are both selected. List the outcomes that comprise the complement of A , A^c .

- A) ABC, ABE, ACD, ACE, ADE, BCE, CDE
- B) ABC, ABE, ACE, ADE, BCE, CDE
- C) ABD, BCD, BDE
- D) ABC, ABE, ACD, ACE, ADE
- E) ACE

Determine whether the events are disjoint.

14) Three board members for a nonprofit organization will be selected from a group of five people. The board members will be selected by drawing names from a hat. The names of the five possible board members are Allison, Betty, Charlie, Dave, and Emily. The possible outcomes can be represented as follows.

14) _____

ABC	ABD	ABE	ACD	ACE
ADE	BCD	BCE	BDE	CDE

Here, for example, ABC represents the outcome that Allison, Betty, and Charlie are selected to be on the board. The events A and B are defined as follows.

A = event that Betty and Allison are both selected
 B = event that more than one man is selected

Are the events A and B disjoint?

- A) Yes
- B) No

15) The number of hours sixth grade students took to complete a research project was recorded with the following results. 15) _____

Hours	Number of students (f)
4	15
5	11
6	19
7	6
8	9
9	16
10	2

A student is selected at random. The events A and B are defined as follows.

A = event the student took at most 9 hours

B = event the student took at least 9 hours

Are the events A and B disjoint?

A) No

B) Yes

Suppose $P(C) = 0.048$, $P(M \text{ and } C) = 0.044$, and $P(M \text{ or } C) = 0.524$. Find the indicated probability.

16) $P(M)$ 16) _____
 A) 0.520 B) 0.480 C) 0.528 D) 0.472 E) 0.524

17) $P(M^c)$ 17) _____
 A) 0.480 B) 0.520 C) 0.472 D) 0.528 E) 0.524

18) $P[(M \text{ and } C)^c]$ 18) _____
 A) 0 B) 0.480 C) 0.952 D) 0.956 E) 0.476

Find the indicated probability.

19) If you flip a coin three times, the possible outcomes are HHH HHT HTH HTT THH THT TTH TTT. What is the probability of getting at least one head? 19) _____
 A) $\frac{1}{8}$ B) $\frac{1}{2}$ C) $\frac{3}{4}$ D) $\frac{1}{4}$ E) $\frac{7}{8}$

20) If two balanced die are rolled, the possible outcomes can be represented as follows. 20) _____

- (1, 1) (2, 1) (3, 1) (4, 1) (5, 1) (6, 1)
- (1, 2) (2, 2) (3, 2) (4, 2) (5, 2) (6, 2)
- (1, 3) (2, 3) (3, 3) (4, 3) (5, 3) (6, 3)
- (1, 4) (2, 4) (3, 4) (4, 4) (5, 4) (6, 4)
- (1, 5) (2, 5) (3, 5) (4, 5) (5, 5) (6, 5)
- (1, 6) (2, 6) (3, 6) (4, 6) (5, 6) (6, 6)

Determine the probability that the sum of the dice is 7.

- A) $\frac{7}{36}$ B) $\frac{5}{36}$ C) $\frac{7}{18}$ D) $\frac{1}{6}$ E) $\frac{2}{9}$

21) If two balanced die are rolled, the possible outcomes can be represented as follows.

21) _____

- (1, 1) (2, 1) (3, 1) (4, 1) (5, 1) (6, 1)
- (1, 2) (2, 2) (3, 2) (4, 2) (5, 2) (6, 2)
- (1, 3) (2, 3) (3, 3) (4, 3) (5, 3) (6, 3)
- (1, 4) (2, 4) (3, 4) (4, 4) (5, 4) (6, 4)
- (1, 5) (2, 5) (3, 5) (4, 5) (5, 5) (6, 5)
- (1, 6) (2, 6) (3, 6) (4, 6) (5, 6) (6, 6)

Determine the probability that the sum of the dice is 4 or 12.

- A) $\frac{7}{36}$
- B) $\frac{5}{36}$
- C) $\frac{1}{9}$
- D) $\frac{1}{6}$
- E) $\frac{1}{12}$

22) In 2006, the General Social Survey asked subjects whether they favored or opposed the death penalty for persons convicted of murder and whether they favored or opposed a law requiring a person to obtain a permit before he or she could buy a gun. The results are summarized in the table below:

22) _____

Frequency Distribution

		GUNLAW		
		1: Favor	2: Oppose	TOTAL
DEATH PENALTY	1: Favor	979	280	1259
	2: Oppose	500	99	599
	TOTAL	1479	379	1858

What is the probability that a randomly selected respondent opposes the death penalty for persons convicted of murder?

- A) 0.269
- B) 0.053
- C) 0.322
- D) 0.204
- E) 0.678

Find the probability using complements.

23) The age distribution of students at a community college is given below.

23) _____

Age (years)	Number of students (f)
Under 21	409
21-24	404
25-28	276
29-32	155
33-36	97
37-40	63
Over 40	86
1490	

A student from the community college is selected at random. Find the probability that the student is 21 years or over. Give your answer as a decimal rounded to three decimal places.

- A) 0.274
- B) 0.271
- C) 0.726
- D) 0.295
- E) 0.729

- 24) Suppose that the probability that a particular brand of light bulb fails before 900 hours of use is 0.2. If you purchase 3 of these bulbs, what is the probability that at least one of them lasts 900 hours or more? 24) _____
- A) none of these
 - B) 0.6
 - C) 0.992
 - D) 0.008
 - E) 0.512

- 25) A greenhouse is offering a sale on tulip bulbs because they have inadvertently mixed pink bulbs with red bulbs. If 40% of the bulbs are pink and 60% are red, what is the probability that at least one of the bulbs will be pink if 4 bulbs are purchased? 25) _____
- A) 0.40
 - B) 1
 - C) 0.8704
 - D) 0.208
 - E) 0.9744

Find the probability of the given event.

- 26) A single fair die is rolled. The number on the die is a 3 or a 5. 26) _____
- A) 2
 - B) $\frac{1}{36}$
 - C) $\frac{1}{2}$
 - D) $\frac{1}{3}$
 - E) $\frac{1}{6}$

- 27) A lottery game has balls numbered 1 through 15. A randomly selected ball has an even number or a 6. 27) _____
- A) 7
 - B) $\frac{7}{15}$
 - C) $\frac{10}{3}$
 - D) $\frac{8}{15}$
 - E) $\frac{3}{10}$

Find the indicated probability.

- 28) In 2006, the General Social Survey asked subjects whether they favored or opposed the death penalty for persons convicted of murder and whether they favored or opposed a law requiring a person to obtain a permit before he or she could buy a gun. According to the survey results, 79.6% of respondents favored the gun law, 67.8% favored the death penalty for those convicted of murder and 52.7% were in favor of both. What is the probability that a randomly selected respondent was in favor of either the gun law or the death penalty for persons convicted of murder? 28) _____
- A) none of these
 - B) 0.527
 - C) 0.947
 - D) 0.796
 - E) 1

- 29) A survey of senior citizens at a doctor's office shows that 52% take blood pressure-lowering medication, 43% take cholesterol-lowering medication, and 5% take both medications. What is the probability that a senior citizen takes either blood pressure-lowering or cholesterol-lowering medication? 29) _____
- A) 0
 - B) 1
 - C) 0.90
 - D) 0.85
 - E) 0.14

Select the most appropriate answer.

- 30) For two events A and B, $P(A) = 0.4$, $P(B) = 0.3$, and $P(A \text{ and } B) = 0$. It follows that A and B are 30) _____
- A) neither disjoint nor independent.
 - B) complementary.
 - C) both disjoint and independent.
 - D) disjoint but not independent.
 - E) independent but not disjoint.

- 31) For two events A and B, $P(A) = 0.8$, $P(B) = 0.2$, and $P(A \text{ and } B) = 0.16$. It follows that A and B are 31) _____
- A) independent but not disjoint.
 - B) disjoint but not independent.
 - C) both disjoint and independent.
 - D) neither disjoint nor independent.
 - E) complementary.

Provide an appropriate response.

- 32) Ten white balls, 20 blue balls and 20 red balls are placed in an urn. If two balls are drawn, with replacement, what is the probability of drawing two white balls? 32) _____
- A) 0.037
 - B) 0.36
 - C) 0.04
 - D) 0.01

- 33) According to the Center for Disease Control, in 2004, 65.7% of all adults between the ages of 18 and 44 were considered current drinkers. Based on this estimate, if two randomly selected adults between the ages of 18 and 44 are selected, what is the probability that at least one is a current drinker? 33) _____
- A) cannot be determined from the information given
 - B) 0.88
 - C) 0.43
 - D) 0.57
 - E) 1

- 34) In 2006, the General Social Survey asked respondents whether they favored or opposed sex education in public schools. According to the survey results, 44% of the respondents were male and 89% favored sex education in public schools. If the events "respondent is male" and "respondent favors sex education in public schools" are independent, what is the probability that a randomly selected respondent was male or favored sex education in public schools? 34) _____
- A) 0.94
 - B) cannot be determined from the information given
 - C) 1
 - D) 0
 - E) 0.39

- 35) A group of volunteers for a clinical trial consists of 88 women and 87 men. 20 of the women and 17 of the men have high blood pressure. Are high blood pressure and gender independent? Explain. 35) _____
- A) Yes; a patient with high blood pressure cannot be both male and female
 B) Yes;
 $P(\text{High blood pressure} | \text{Female}) = 0.227$
 $P(\text{High blood pressure} | \text{Male}) = 0.227$
 These are equal.
 C) No;
 $P(\text{High blood pressure and Male}) = 0.097$
 $P(\text{High blood pressure and Female}) = 0.114$
 These are not equal
 D) Yes;
 $P(\text{High blood pressure} | \text{Female}) = 0.211$
 $P(\text{High blood pressure} | \text{Male}) = 0.211$
 These are equal.
 E) No;
 $P(\text{High blood pressure}) = 0.211$
 $P(\text{High blood pressure} | \text{Female}) = 0.227$
 These are not equal

Find the indicated probability.

- 36) A group of volunteers for a clinical trial consists of 81 women and 77 men. 18 of the women and 19 of the men have high blood pressure. If one of the volunteers is selected at random find the probability that the person has high blood pressure given that it is a woman. 36) _____
- A) 0.222 B) 0.356 C) 0.234 D) 0.486 E) 0.114

- 37) The following table shows the political affiliation of voters in one city and their positions on stronger gun control laws. 37) _____

	Stronger Gun Control	
	Favor	Oppose
Republican	0.11	0.27
Democrat	0.25	0.16
Other	0.15	0.06

What is the probability that a Democrat opposes stronger gun control laws?

- A) 0.327 B) 0.610 C) 0.390 D) 0.490 E) 0.160

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

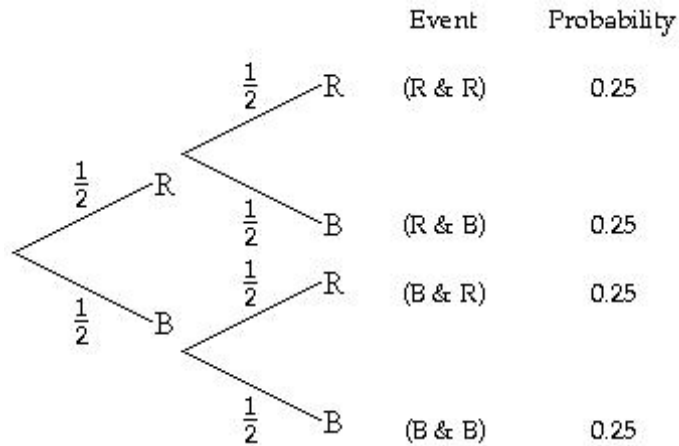
- 38) A production process of computer parts uses two machines, one old machine and one new machine. If the old machine is used, the probability that a defective part is produced is 0.13. If the new machine is used, the probability that a defective part is produced is 0.04. Moreover, the new machine produces parts 4 times as fast as the old machine does. What is the probability that a randomly selected part produced by this process is defective? 38) _____
- 39) A production process of computer parts uses two machines, one old machine and one new machine. If the old machine is used, the probability that a defective part is produced is 0.13. If the new machine is used, the probability that a defective part is produced is 0.04. Moreover, the new machine produces parts 4 times as fast as the old machine does. When a defective part is produced, what is the probability that the old machine was used? 39) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

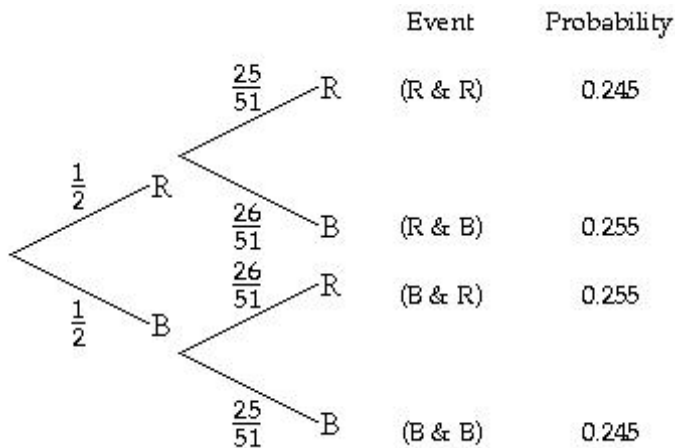
Draw a tree diagram to represent the problem. At the end of each branch use symbols to represent the event that the branch corresponds to and give the probability of the event.

- 40) Two cards are selected randomly without replacement from a standard deck of 52 cards. The color of each card (red or black) is recorded. Draw a tree diagram showing the possible outcomes and their probabilities for this problem. 40) _____

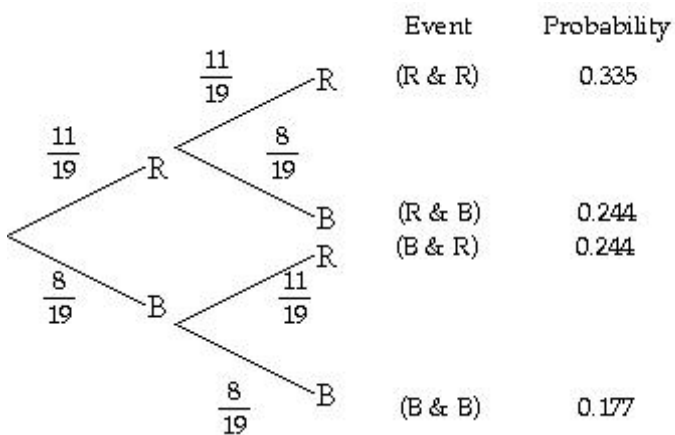
A)



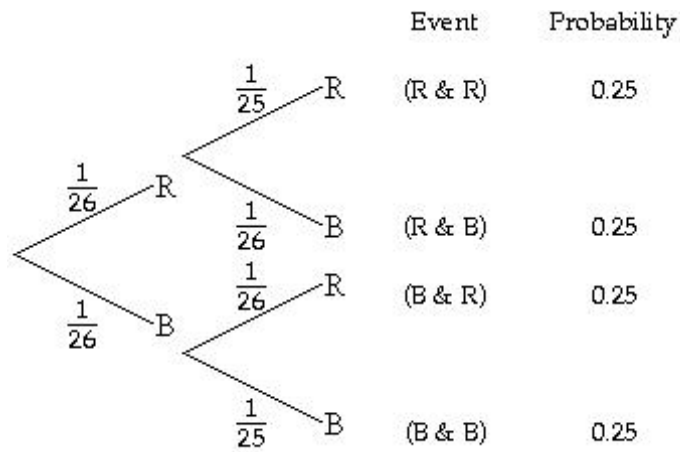
B)



C)



D)



E)

