Exam

Name_____

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

1) How many subsets does the set $B = \{1, 3, 7,9\}$ have? 1) _____

A) 24

B) 32

C) 34

D) $4 \cdot 3 \cdot 2$

E) none of the above

There are 30 electric calculators, four of which need to be recharged. An instructor takes 25 of the 30 calculators to his statistics class.

2) How many samples of 25 calculators contain all four calculators that need to be recharged? 2) _____

A) $\binom{30}{4}$

B) $\binom{30}{25}$

C) $\binom{25}{4}$

D) $\binom{26}{21}$

E) none of the above

A total of 37,451 Ph.D.'s were earned in 1991. Out of the 1164 Ph.D.'s in business and management, 292 were earned by women. Women earned 13,782 Ph.D.'s.

3) How many men earned Ph.D's in business and management? 3) _____

A) 872

B) 13,490

C) 23,669

D) The number cannot be determined.

E) none of the above

4) How many three–letter words can be formed allowing repetition of letters? 4) _____

A) $26 \cdot 25 \cdot 24$

B) 26^3

C) $3 \cdot 26$

D) 326

E) none of the above

5) An exam contains 5 multiple–choice questions, each having 4 possible answers. In how many different ways can the exam be completed? 5) _____

A) 4^5

B) 54

C) C(5, 4)

D) $5 \cdot 4 \cdot 3 \cdot 2$

E) none of the above

Out of 30 job applicants, 11 are female, 17 are college graduates, 7 are bilingual, 3 are female college graduates, 2 are bilingual women, 6 are bilingual college graduates, and 2 are bilingual female college graduates.

6) The number of women who are not college graduates but nevertheless are bilingual is 6) _____

A) 2.

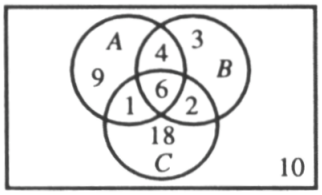
B) 9.

C) 11

D) 0.

E) none of the above

7) Consider the Venn diagram below. 7) _____



$n((A \cap B) \cup C) =$

A) 8.

B) 21

C) 13

D) 31

E) none of the above

8) The set $A \cap A'$ is 8) _____

A) U.

B) A.

C) $\emptyset$.

D) $A \cup A'$.

E) none of the above

9) How many three–digit codes can be formed using the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 if the last digit cannot be 0 or 1 and repetition of digits is allowed? 9) _____

A) 512

B) 504

C) 800

D) 720

E) none of the above

10) Eight horses are entered in a race. In how many ways can they cross the finish line if ties are not allowed? 10) _____

A) 8

B) $8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2$

C) 2^8

D) 8^8

E) none of the above

11) Evaluate $\begin{pmatrix} 10 \\ 2 \end{pmatrix}$. 11) _____

A) 22

B) 45

C) 5

D) 1,814,400

E) none of the above

A shipment of twenty radios contains six defective radios. Two radios are randomly selected from the shipment.

12) For the situation above, the probability that both radios selected are defective is 12) _____

A) $\frac{14}{17}$.

B) $\frac{15}{19}$.

C) $\frac{3}{10}$.

D) $\frac{1}{3}$.

E) none of the above

13) The probability of getting either a black card or an ace in one draw from an ordinary deck of 52 cards is 13) _____

A) $\frac{26}{52}$.

B) $\frac{28}{52}$.

C) $\frac{30}{52}$.

D) $\frac{29}{52}$.

E) none of the above

A light bulb manufacturer tests a light bulb by letting it burn until it burns out. The experiment consists of observing how long (in hours) the light bulb burns. Let E be the event "the bulb lasts less than 100 hours," F be the event " the bulb lasts less than 50 hours, " and G be the event "the bulb lasts more than 120 hours."

14) The event $F' \cap G'$ is 14) _____

A) all possible times.

B) "the bulb lasts between 50 and 120 hours inclusive"

C) "the bulb lasts between 120 hours or less".

D) "the bulb lasts 50 hours or more".

E) none of the above

15) Events E and F are independent and $\Pr(F) \neq 0$. Which of the following must be true? 15) _____

A) $\Pr(E \cap F) = 0$

B) $\Pr(E \cup F) = \Pr(E) + \Pr(F)$

C) $\Pr(E \mid F) = \Pr(F)$

D) $\Pr(E \mid F) = 0$

E) none of the above

Fifty percent of students enrolled in an astronomy class have previously taken physics. Thirty percent of these studens received an A for the astronomy class, whereas twenty percent of the other students received an A for astronomy. Find the probablility that a student selected at random

16) previously took a physics course, given that they received an A in the astronomy course. 16) _____

A) .40

B) .15

C) .6

D) .25

E) none of the above

17) A coin is tossed seven times and the sequence of heads and tails is observed. 17) _____
The number of different outcomes having exactly three heads is

A) 210.

B) 10.

C) 21.

D) 35.

E) none of the above

Consider the following sets.
U ={all professors}
A ={female professors}
B ={professors under 40 years of age}

18) $(A \cap B)'$ is the set 18) _____

A) {professors who are female or under 40}.

B) {professors who are male and under 40}.

C) {professors who are male or 40 or older}.

D) {professors who are male and 40 or older}.

E) none of the above

19) The set $A \cup A'$ is 19) _____

A) U.

B) A.

C) $\emptyset$.

D) $A \cap A'$.

E) none of the above

Suppose that 30% of all small businesses are undercapitalized, 40% of all undercapitalized small business fail, and 20% of all small businesses that are not undercapitalized fail.

20) A small business is chosen at random and is found to have failed. Based on the statistics above, the probability that the business was undercapitalized is 20) _____

A) $\frac{7}{10}$.

B) $\frac{6}{13}$.

C) $\frac{3}{10}$.

D) $\frac{6}{37}$.

E) none of the above

21) Two events A and B are mutually exclusive if 21) _____

A) $A \cap B = \emptyset$.

B) $A \cup B = U$.

C) $A \cap B = U$.

D) $A \cup B = \emptyset$.

E) none of the above

22) Ten cars ccan park in ten parking spaces. In how many ways can they park if only one car is allowed per space? 22) _____

A) 210

B) 10

C) $10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2$

D) 10^{10}

E) none of the above

23) Two fair dice are rolled. The probability that the numbers that appear add to 4 is 23) _____

A) $\frac{1}{36}$

B) $\frac{1}{12}$

C) $\frac{1}{6}$

D) $\frac{1}{5}$

E) none of the above

24) Probability 24) _____

A) can be applied to events that we see in both our personal and professional lives.

B) is the branch of mathematics that studies long–term patterns of random events by repeated observations.

C) assigns realistic numbers to random events.

D) all of the above

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

Solve the problem.

25) Urn I contains two white balls and five red balls; urn II contains six white balls and four red balls. An urn is chosen at random and then a ball is chosen from that urn. 25) _____

(a) Draw a tree diagram for this two–stage experiment, and label it with the appropriate probabilities.

(b) What is the probability that the chosen ball is white?

(c) What is the probability that the chosen ball came from urn I, if it is white?

In a study of the ages of its employees, over a period of several years a university finds the following:

Age (years)	Probability
18–30	**0.20**
18–45	**0.65**
18–60	**0.90**
18–80	**1.00**

26) Find the probability that an employee selected at random is at least 46 years old. 26) _____

Solve the problem.

27) In how many ways can a jury of 12 people be chosen from an available pool of fourteen women and six men if the jury must consist of eight women and four men? 27) _____

28) The probability that a student will pass mathematics is 0.8, that she will pass physics is 0.65 and that she will pass both courses is 0.6. Find the probability that 28) _____

(a) she will pass at least one of the two courses.

(b) she will pass physics but not mathematics.

(c) she will fail both courses.