Post-Test
Probability & Statistics

1. If set A has m elements and set B has n elements where $n > m$. What is the greatest number of elements in:
   a. $A \cup B$?
   b. $A \cap B$?

2. A survey of 100 college men found that 75 had a stereo, 45 had a car, and 10 had a car but not a stereo.
   a. How many had neither a car nor a stereo?
   b. If one of the men in the survey is selected at random, what is the probability that he has stereo but not a car?

3. License plates in a sparsely populated state consist of two letters chosen from the set $\{A, B, C, D, E\}$ followed by 4 digits selected from the integers $1, 2, 3, \ldots, 6$.
   a. How many license plates are there if no letter and no digit can be repeated.
   b. Suppose that letters can be repeated but digits cannot. How many license plates begin with a vowel?

4. Calculate:
   a. $\dfrac{8!}{2!4!}$
   b. $_9C_5$
   c. $_7P_4$

5. A U.S. Congressional Committee has 11 members, 6 Republicans and 5 Democrats.
   a. In how many ways can the Committee elect a chair, vice-chair, and secretary if the chair must be a Republican and the Vice-Chair and Secretary can come from either party?
   b. How many 5-member subcommittees can be formed having exactly 3 Republicans and 2 Democrats?

6. A probability experiment has 6 possible outcomes $\{e_1, e_2, \ldots, e_6\}$ whose probabilities are given in the following table:

e_1	e_2	e_3	e_4	e_5	e_6
.20	.15	?	.25	.10	.18

   Event $A = \{e_2, e_3, e_6\}$, event $B = \{e_1, e_3, e_4, e_6\}$, and event $C = \{e_1, e_2, e_5\}$.
   a. Calculate $P(A)$.
   b. Calculate $P(B \cup C)$.
   c. Calculate $P(A \mid B)$. Are A and B independent?

7. In a family with 3 children, excluding multiple births and assuming that a boy is as likely as a girl at each birth, what is the probability of having:

a. 2 boys and 1 girl in that order?
b. 2 boys and 1 girl in any order?
c. At least one child of each sex?

8. An experiment consists of rolling 2 identical fair dice and adding the numbers on the faces that turn up. Find the probability that the sum is:

a. Less than 2   b. Greater than 9.   c. What are the odds for rolling a 7?

9. The data in the following table were obtained by surveying 1000 residents of Harris County concerning their political affiliations and their preferences in an upcoming election.

	Republican	Democrat	Unaffiliated	Total
Candidate A	200	100	85	385
Candidate B	250	230	50	530
No Preference	50	20	15	85
Total	500	350	150	1000

Suppose that one of these residents is selected at random.
a. What is the probability that he/she is not affiliated with a political party?
b. What is the probability that he/she is affiliated with a political party and prefers Candidate A?
c. If the person is a Republican, what is the probability that he/she has "no preference" in the election?

10. An urn contains 2 red marbles, 3 white marbles and 4 blue marbles. Two marbles are drawn out of the urn in succession. What is the probability that both marbles are the same color if:
a. The first marble is replaced before the second marble is drawn?
b. The first marble is not replaced before the second marble is drawn?

11. The table below shows the result of a survey of 1000 college seniors regarding their plans after graduation.

Plan	Graduate School	Professional School	Self Employment	Corporate Employment	Government Employment	No Plan
Frequency	129	281	33	380	49	128

Which of the following would be the most appropriate graphical method for depicting this data?

(a) A bar chart

(b) A box and whisker diagram

(c) A stem and leaf diagram

(d) An ogive (cumulative frequency polygon)

(e) A scatterplot

12. The stem and leaf diagram below depicts shows the grades (on a scale of 0 to 100) of 69 students on a final exam. What is the median?
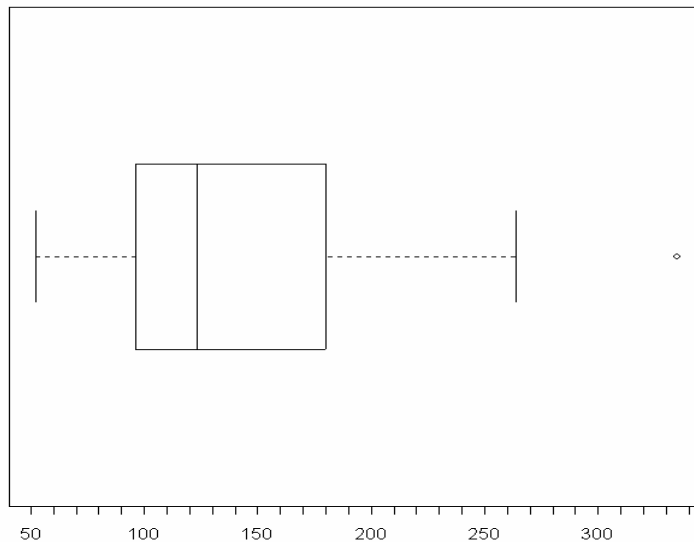
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5 | 778
6 | 1122334
6 | 555666777799999
7 | 001123333344
7 | 5555666777779
8 | 00222244
8 | 5567788999
9 | 1
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13. Pictured below is a box and whisker diagram of horsepower ratings of automobiles. The interquartile range is closest to (choose one):
    (a) 180   (b) 85   (c) 45   (d) 125   (e) 210

14. The boxplot above shows that the distribution of horsepower ratings is (choose one):
    (a) skewed   (b) heteroscedastic   (c) symmetric
    (d) normal   (e) binomial

15. Scores on a nation-wide professional qualifying exam have a mean of 600 and a standard deviation of 50. A random sample of 100 examinees was selected. The sample mean was 630. What was the standardized value or z-score of the sample mean in this instance.