PERMUTATIONS AND COMBINATIONS WORKSHEET
CTQR 150

1. If the NCAA has applications from 6 universities for hosting its intercollegiate tennis championships in 2006 and 2007, how many ways may they select the hosts for these championships

    a) if they are not both to be held at the same university?

    b) if they may both be held at the same university?

2. There are five finalists in the Mr. Rock Hill pageant. In how many ways may the judges choose a winner and a first runner-up?

3. In a primary election, there are four candidates for mayor, five candidates for city treasurer, and two candidates for county attorney. In how many ways may voters mark their ballots

    a) if they vote in all three of the races?

    b) if they exercise their right not to vote in any or all of the races?

4. A multiple-choice test consists of 15 questions, each permitting a choice of 5 alternatives. In how many ways may a student fill in the answers if they answer each question?

5. A television director is scheduling a certain sponsor's commercials for an upcoming broadcast. There are six slots available for commercials. In how many ways may the director schedule the commercials

    a) If the sponsor has six different commercials, each to be shown once?

    b) If the sponsor has three different commercials, each to be shown twice?

    c) If the sponsor has two different commercials, each to be shown three times?

    d) If the sponsor has three different commercials, the first of which is to be shown three times, the second two times, and the third once?

6. In how many ways may can five persons line up to get on a bus?

7. In how many ways may these same people line up if two of the people refuse to stand next to each other?

8. In how many ways may 8 people form a circle for a folk dance?

9. How many permutations are there of the letters in the word "great"?

10. How many permutations are there of the letters in the word "greet"?

11. How many distinct permutations are there of the word "statistics"?

12. How many distinct permutations of the word "statistics" begin and end with the letter "s"?

13. A college football team plays 10 games during the season. In how many ways can it end the season with 5 wins, 4 losses, and 1 tie?

14. If eight people eat dinner together, in how many different ways may 3 order chicken, 4 order steak, and 1 order lobster?

15. Suppose a True-False test has 20 questions.

   a) In how many ways may a student mark the test, if each question is answered?
   b) In how many ways may a student mark the test, if 7 questions are marked correctly and 13 incorrectly?
   c) In how many ways may a student mark the test, if 10 questions are marked correctly and 10 incorrectly?

16. Among the seven nominees for two vacancies on the city council are three men and four women. In how many ways may these vacancies be filled

   a) with any two of the nominees?
   b) with any two of the women?
   c) with one of the men and one of the women?

17. Mr. Jones owns 4 pairs of pants, 7 shirts, and 3 sweaters. In how many ways may he choose 2 of the pairs of pants, 3 of the shirts, and 1 of the sweaters to pack for a trip?

18. In how many ways may one A, three B's, two C's, and one F be distributed among seven students in a CTQR 150 class?

19. An art collector, who owns 10 original paintings, is preparing a will. In how many ways may the collector leave these paintings to three heirs?

20. A baseball fan has a pair of tickets to 6 different home games of the Chicago Cubs. If the fan has five friends who like baseball, how many ways may he take one of them along to each of the six games?

ANSWERS
PERMUTATIONS AND COMBINATIONS WORKSHEET

1. a) $6 \cdot 5 = 30$    b) $6 \cdot 6 = 36$

2. $5 \cdot 4 = 20$

3. a) $4 \cdot 5 \cdot 2 = 40$    b) $5 \cdot 6 \cdot 3 = 90$

4. $5^{15} = 30,517,578,125$

5. a) $6! = 720$    b) $C(6,2) \cdot C(4,2) = 90$    c) $C(6,3) = 20$    d) $C(6,3) \cdot C(3,2) = 60$

6. $P(5,5) = 5! = 120$

7. $5! - 4 \cdot 2 \cdot 3! = 72$

8. $\dfrac{8!}{8} = 7! = 5040$

9. $5! = 120$

10. $\dfrac{5!}{2!} = 60$

11. $\dfrac{10!}{3!3!2!} = 50,400$

12. $\dfrac{8!}{3!2!} = 3360$

13. $C(10,5) \cdot C(5,4) = 1260$

14. $C(8,3) \cdot C(5,4) = 280$

15. a) $2^{20} = 1,048,576$    b) $C(20,7) = 77,520$    c) $C(20,10) = 184,756$

16. a) $C(7,2) = 21$    b) $C(4,2) = 6$    c) $C(4,1) \cdot C(3,1) = 12$

17. $C(4,2) \cdot C(7,3) \cdot C(3,1) = 630$

18. $C(7,1) \cdot C(6,3) \cdot C(3,2) = 420$

19. $3^{10} = 59,049$

20. $5^6 = 15,625$