Dr. Watt MATH M118: Finite Mathematics Test #2: Counting and Probability **FORM 1**

Name: _____ ID: _____

Directions:

- Be sure to use a number 2 pencil.
- Put your name and full (9 digit) student identification number in the blanks above.
- Put your last and first name on the scantron sheet.
- Put your full (9 digit) student identification number on the scantron sheet.
- Put the form number (located on the top line of this test booklet) on the scantron sheet.
- There is only one best response for each question.
- There is no penalty for guessing.
- Turn the test booklet and scantron sheet in when completed.

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1. Evaluate: $P(10, 3)$

   [a] 1,000 [b] 720 [c] 120 [d] 7 [e] 3

2. Is the following statement true or false? $C(5, 3) = C(4, 2) + C(4, 3)$

   [a] True [b] False

3. How many seating arrangements exist for a round table with six seats?

   [a] 720 [b] 120 [c] 36 [d] 6 [e] 1

4. Evaluate: $3!\ 3!$

   [a] 362,880
   [b] 720
   [c] 36
   [d] 27
   [e] 1

5. How many different ways can a student answer 10 true-false questions on a test?

   [a] 1,024
   [b] 100
   [c] 10

[d] 2
[e] 1

6. How many license plates can be produced using five symbols on each plate where the first two symbols are letters of the alphabet and the following three symbols are the numbers selected from the set {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}? Any number or letter can be repeated on any given license plate.

[a] C(26, 2) C(10, 3) = 39,000
[b] 26 x 25 x 10 x 9 x 8 = 468,000
[c] 26 x 25 x 10 x 10 x 10 = 650,000
[d] 26 x 26 x 10 x 9 x 8 = 486,720
[e] 26 x 26 x 10 x 10 x 10 = 676,000

7. A couple wants to tour four cities in Europe (London, Hamburg, Paris, and Zurich) on their honeymoon. If an itinerary is the order in which these cities will be visited, how many different itineraries exist?

[a] P(4, 4) = 24
[b] C(4, 4) = 1
[c] 4 x 4 x 4 x 4 = 256
[d] P(4, 1) = 4
[e] C(4, 1) = 4

8. How many ways can a committee of 20 people elect a president, secretary, and a treasurer?

[a] 3,486,784,401
[b] 8,000
[c] 6,840
[d] 1,140
[e] 3

9. Ten people attend a party. If each person at the party shakes hands with every other person, how many handshakes will have been made?

[a] 1024
[b] 100
[c] 90
[d] 45
[e] 10

10. How many ways can 6 equivalent contracts be awarded to 10 different firms, if no two contracts are awarded to the same firm?

[a] 151,200
[b] 210
[c] 6
[d] 1
[e] None of the above.

11. How many ways can all of the letters in the word ***ABRACADABRA*** be arranged?

    [a] 39,916,800
    [b] 1,995,840
    [c] 83,160
    [d] 11
    [e] None of the above.

12. A six member volleyball team is to be selected from a class of 6 boys and 8 girls. How many different ways can the team be selected if the number of boys must equal the number of girls selected?

    [a] P(6, 3) P(8, 3)
    [b] C(6, 3) C(8, 3)
    [c] P(14, 6)
    [d] C(14, 6)
    [e] 6

13. An urn contains 6 red, 3 white, and 2 blue marbles. In how many ways can 3 marbles be selected so that at least one is blue?

    [a] P(2, 1) + P(2, 2)
    [b] C(2, 1) + C(2, 2)
    [c] 2
    [d] P(2, 1) P(9, 2) + P(2, 2) P(9, 1)
    [e] C(2, 1) C(9, 2) + C(2, 2) C(9, 1)

14. A man has a penny, a nickel, a dime, a quarter, and a half-dollar coin in his pocket. The man reaches into his pocket and randomly selects 3 coins. How many different sums can the 3 coins form?

    [a] 1,000
    [b] 720
    [c] 10
    [d] 5
    [e] None of the above.

15. A set contains 5 elements. How many subsets can be formed from this set?

    [a] 3,125
    [b] 120
    [c] 32
    [d] 5
    [e] 1

16. How many different committees of four can be formed from 20 Republicans and 15 Democrats if at least one Republican and at least one Democrat must be on the committee?

    [a] C(20, 1) C(15, 3) + C(20, 2) C(15, 2) + C(20, 3) C(15, 1)
    [b] C(20, 1) + C(20, 2) + C(20, 3)

[c] C(15, 3) + C(15, 2) + C(15, 1)
[d] P(20, 1) + P(20, 2) + P(20, 3)
[e] P(15, 3) + P(15, 2) + P(15, 1)

17. Five cards are drawn from a deck of 52. How many different hands of 5 cards contain all the same suit?

[a] C(52, 5)
[b] P(4, 1) P(13, 5)
[c] C(4, 1) C(13, 5)
[d] C(13, 5)
[e] P(13, 5)

18. A gym class contains twelve boys and ten girls. How many different ways can a team of six with at least one boy be selected?

[a] 74,403
[b] 924
[c] 22
[d] 6
[e] None of the above.

19. On a single roll of a fair die, what is the probability that the number that appears is less than 4?

[a] 1/6
[b] 2/6
[c] 3/6
[d] 4/6
[e] 5/6

20. Let *A* and *B* be disjoint events with Pr[*A*] = .15 and Pr[*B*] = .45. Determine the Pr[*A* *B*].

[a] 0.6
[b] 0.5325
[c] 0.0675
[d] 0
[e] None of the above.

21. Given independent events *A* and *B* such that Pr[*A*] = .15 and Pr[*B*] = .45. Determine Pr[*A* *B*].

[a] 0.6
[b] 0.5325
[c] 0.0675
[d] 0
[e] None of the above.

22. If the odds in favor of an event are 7 to 5, what is the probability that the event will **not** occur?

[a] 5/10
[b] 7/10
[c] 5/12
[d] 7/12
[e] None of the above.

23. An urn contains 6 white and 2 blue balls. A sample of 4 balls is selected at random. What is the probability that the sample contains 2 white and 2 blue balls?

[a] 1/2
[b] 1/4
[c] 1/14
[d] 3/14
[e] None of the above.

24. A salesperson plans to visit Annapolis, Bloomington, Carmel, Detroit, and Elksville on his business trip. Since Annapolis is not in the midwest, he wants to visit that city last. If his boss randomly selects the order of all 5 cities to be visited, what is the probability that Annapolis is last?

[a] 0.00833
[b] 0.2
[c] 0.25
[d] 0.4
[e] None of the above.

25. Five cards are drawn from a standard deck of 52. What is the probability that all five cards are of the same suit?

[a] $\Pr[\text{same suit}] = \dfrac{P(4,1)\,P(13,5)}{P(52,5)}$
[b] $\Pr[\text{same suit}] = \dfrac{C(4,1)\,C(13,5)}{C(52,5)}$
[c] $\Pr[\text{same suit}] = \dfrac{P(13,5)}{P(52,5)}$
[d] $\Pr[\text{same suit}] = \dfrac{C(13,5)}{C(52,5)}$
[e] None of the above.

26. Let E and F be events where $\Pr[E] = .6$, $\Pr[F] = .5$, and $\Pr[E \cap F] = .4$. Determine $\Pr[E \cap F']$.

[a] .2
[b] .3
[c] .5
[d] .9
[e] None of the above.

27. Of Americans, 26% are under 18. What are the odds that a person selected at random is under 18?

[a] 26 to 100
[b] 74 to 100
[c] 26 to 74
[d] 74 to 26
[e] None of the above.

28. A pair of dice is rolled and the sum of the points is noted. Determine the probability that the sum is 10 given that one die resulted in a 4.

[a] 3/36 = 1/12
[b] 2/36 = 1/18
[c] 2/11
[d] 2/3
[e] None of the above.

29. A committee consists of 4 men and 6 women. If 5 people are selected at random, what is the probability that at least 3 men are chosen?

[a] $\Pr[E] = \dfrac{C(4,3)C(6,2)}{C(10,5)}$

[b] $\Pr[E] = 1 - \dfrac{C(4,0) + C(4,1) + C(4,2}{C(10,5)}$

[c] $\Pr[E] = \dfrac{C(4,3)C(6,2) + C(4,4)C(6,1) + C(4,5)C(6,0}{C(10,5)}$

[d] $\Pr[E] = \dfrac{C(4,3)C(6,2) + C(4,4)C(6,1)}{C(10,5)}$

[e] None of the above.

30. In a swimming event, 2 of the 7 contestants are Americans. The contestants are randomly assigned to lanes 1 through 7. What is the probability that the two Americans are assigned to the first two lanes?

[a] 1/21
[b] 2/21
[c] 3/21
[d] 4/21
[e] None of the above.

31. A test for diabetes results in a correct positive 90% of the time, and a correct negative 95% of the time. If 10% of the population has diabetes, what is the probability that a randomly selected person will have a false-positive test result?

[a] 0.045
[b] 0.055
[c] 0.01
[d] 0.09
[e] None of the above.

32. Let C and D be events with $\Pr[C] = .4$, $\Pr[D] = .5$, and $\Pr[C \quad D] = .6$. Determine the $\Pr[C \mid D]$.

[a] 3/10
[b] 5/6
[c] 4/6
[d] 6/5
[e] 3/5

33. An urn contains 10 balls numbered 1 through 10. Seven balls are drawn one at a time at random without replacement. Find the probability that exactly three odd-numbered balls are drawn and they occur on odd-numbered draws from the urn.

[a] $\Pr[E] = \dfrac{4 \quad P(5,3)P(5,4)}{P(10,7)}$

[b] $\Pr[E] = \dfrac{4 \quad C(5,3)C(5,4}{C(10,7)}$

[c] $\Pr[E] = \dfrac{P(5,3)P(5,4)}{P(10,7)}$

[d] $\Pr[E] = \dfrac{C(5,3)C(5,4)}{C(10,7)}$

[e] $\Pr[E] = \dfrac{5^3 \quad 5^4}{10^7}$