Probability Worksheet 3 NAME:

Part I: Each problem below investigates the probability that a single event occurs. For each problem, give the desired probability and either describe or list the successes. Since they involve a single event, each of the probabilities can be found be figuring

$$\text{Probability of an event} = \frac{\text{number of successes}}{\text{number of total possibilities}}$$

1. Consider a bag with ten marbles: four red, three green, and three blue. If I select one marble from the bag, what is the probability that I get a red marble?

2. Consider a deck of poker cards. A poker deck contains four suits: diamonds, hearts, spades, and clubs. The diamonds and hearts are red and the spades and clubs are black. Each suit has thirteen cards: Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, and King. This makes a total of 52 cards. A face card will be defined to be a Jack, Queen, or King.
If I select one card out of the deck, what is the probability I get a red Ace?

3. The following table lists the ages of the people in my knitting club, which has a total of 50 people. If I select a person from this group randomly, what is the probability that the person is 25?

Age	**Number of people**
22	2
25	8
31	20
39	15
45	5

4. Margo and Juan are expecting a child. What is the probability that they have a girl?

5. You roll two distinguishable dice. What is the probability that the sum is 7?

6. You roll a single die. What is the probability that you roll an even number?

Part II: Each problem below investigates the probability that two or more events occur. For each problem, tell whether the events are mutually exclusive and/or independent. Write down the correct formula to use (from Probability Worksheet 2) and find the desired probability. By writing the formula out explicitly, it should be clear what you think the separate events are. Remember also the difference between OR and AND. Make it clear which you think applies. The first one is done for you.

1. Margo and Juan are planning on having three children. What is the probability that they have all girls? (Here, list the sample space for their three children and circle the success.)

Mutually exclusive? ___NO__

Independent? ___YES___

P(A and B and C) = P(A)*P(B)*P(C)

P(first is girl AND second is girl AND third is girl)

=P(first is girl)*P(second is girl)*P(third is girl)

$= \frac{1}{2} * \frac{1}{2} * \frac{1}{2} = \frac{1}{8}$

(GGG) BBB

GGB BBG

GBG BGB

GBB BGG

Three events:
1. first is girl, AND
2. second is girl, AND
3. third is girl

Notice the extension of Rule #3 from Probability Worksheet 2.

2. Consider a deck of poker cards. A poker deck contains four suits: diamonds, hearts, spades, and clubs. The diamonds and hearts are red and the spades and clubs are black. Each suit has thirteen cards: Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, and King. This makes a total of 52 cards. A face card will be defined to be a Jack, Queen, or King. You select one card, record its suit, replace the card in the deck, and then select another. What is the probability that you get a Spade and then a Club?

Mutually exclusive? _____

Independent? _____

3. Consider a deck of poker cards. A poker deck contains four suits: diamonds, hearts, spades, and clubs. The diamonds and hearts are red and the spades and clubs are black. Each suit has thirteen cards: Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, and King. This makes a total of 52 cards. A face card will be defined to be a Jack, Queen, or King. You select one card, record it, do **not** replace the card in the deck, and then select another. What is the probability that you get a Spade and then a Club?

Mutually exclusive? _____

Independent? _____

4. I roll a die and toss a coin. What is the probability I get an even number and a Heads?

Mutually exclusive? _____

Independent? _____

5. I have a bag with ten marbles: four red, three green, and three blue. I will select a marble. What is the probability that I get a red or green marble?

Mutually exclusive? _____

Independent? _____

6. I roll two distinguishable dice, a white one and a red one. What is the probability that the sum of the two dice is 6 or the white die is a 1?

Mutually exclusive? _____

Independent? _____

7. I roll two distinguishable dice, a white one and a red one. What is the probability that the sum of the two dice is 6 or the white die is 6?

Mutually exclusive? _____

Independent? _____

8. I roll two distinguishable dice, a white one and a red one. What is the probability that the sum of the two dice is 6 and the white die is 1?

Mutually exclusive? _____

Independent? _____

9. I roll a die and toss a coin. What is the probability I get an even number or a Heads?

Mutually exclusive? _____

Independent? _____

10. Consider a deck of poker cards. A poker deck contains four suits: diamonds, hearts, spades, and clubs. The diamonds and hearts are red and the spades and clubs are black. Each suit has thirteen cards: Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, and King. This makes a total of 52 cards. A face card will be defined to be a Jack, Queen, or King. I will select one card from the deck. What is the probability that it is a red face card? (We can find this probability by finding "number of successes divided by number of possibilities" getting $6/52$. However, let's find it by considering the two events "card is red" and "card is face".)

Mutually exclusive? _____

Independent? _____