BMCC MAT150.722 Exam 2

You will be given all class to complete this test. In the event these instructions conflict with what I say in class, what I say takes precedence. You are allowed to have one sheet of notes. Each problem is worth 10 points. Good luck!

1 Vocabulary

Match each example from the first column with the term in the second column which helps compute its probability.

(1.1)	The probability of winning a game given you do not know the rules.	(A)	Uniform distribution
(1.2)	The probability that you are in statistics class and you share a birthday with a classmate.	(B)	Binomial distribution
(1.3)	The probability that in a game of Monopoly you roll doubles seven times in eight rolls.	(C)	Multiplication rule
(1.4)	The probability your favorite team is not in the Final Four of the NCAA men's basketball tournament.	(D)	Conditional Probability
(1.5)	The probability of drawing the Ace of Spades from a standard deck.	(E)	Complement

2 Binomial Distribution

Indicate whether the following problems can be solved using the binomial distribution. On your answer sheet write T if can and F otherwise.

(2.1) Determine the probability that when 50 fair pennies are tossed exactly 37 land heads up.

(2.2) One child is randomly selected per family in a group of 250 families. What is the probability the number of boys selected exceeds 100?

(2.3) The probability that 10 last names on a page in a given phone book begin with vowels.

(2.4) What is the probability your opening rack in a game of Scrabble is AAAAAAA.

(2.5) You line up fifteen of your closest friends on a wall and ask each of them to spell the word "potato" aloud, one after the other. What is the probability that at least ten spell it right?

3 Counting

3.1 How many ways can you arrange 5 books on a shelf?

(A) 20

(B) 120

(C) 720

(D) 5040

(E) None of these

3.2 What is $\frac{1024!}{(512)!}$

(A) ${}_{512}C_{512}$

(B) ${}_{512}C_{1024}$

(C) ${}_{1024}C_{512}$

(D) ${}_{1024}C_{1024}$

(E) None of these

3.3 What is ${}_{99}C_{42}$

(A) $\frac{42!}{99! \cdot 57!}$

(B) $\frac{57!}{42! \cdot 99!}$

(C) $\frac{99!}{57! \cdot 42!}$

(D) $\frac{57! \cdot 42!}{99!}$

(E) None of these

For the next two parts, use the following portion of Pascal's traingle.

					1							
				1		12						
			1		13		78					
		1		14		91		364				
	1		15		105		455		1365			
1		16		120		560		1820		4386		

3.4 Read ${}_{15}C_2$ from Pascal's Triangle.

(A) 17

(B) 105

(C) 120

(D) 1365

(E) None of these

3.5 Calculate ${}_{17}C_3$ from Pascal's Triangle.

(A) 34

(B) 120

(C) 560

(D) 680

(E) None of these

4 Binomial Distribution

This year for the Kid's Choice Awards, Nickelodeon is thinking of bringing back Mark Summers to host a celebrity version of the classic game show *Double Dare*. For one game, Justin Bieber and Rebecca Black are slated to participate. In their game each must answer 10 questions and who ever answers the most correctly will be allowed to present the award in the Favorite Movie category. But in true *Double Dare* form, each time a question is asked, there is a 30% chance that the contestant will be slimed, whether or not the answer is correct. Let the number of times that Justin Bieber gets slimed be X.

4.1 What is n in this case?

(A) 2

(B) 5

(C) 7

(D) 10

(E) None of these

4.2 What is p?

(A) .25

(B) .3

(C) .75

(D) .7

(E) None of these

4.3 What number do you expect X to be?

(A) 2

(B) 5

(C) 7

(D) 10

(E) None of these

4.4 What is the probability that $X = 3$?

(A) $({}_{10}C_7)(.3)^3(.7)^7$

(B) $({}_3C_{10})(.3)^3(.7)^7$

(C) $1 - ({}_{10}C_7)(.3)^3(.7)^3$

(D) $1 - ({}_{10}C_3)(.3)^7(.7)^7$

(E) None of these

4.5 What is the probability that $X \neq 3$?

(A) $({}_{10}C_7)(.3)^3(.7)^7$

(B) $({}_3C_{10})(.3)^3(.7)^7$

(C) $1 - ({}_{10}C_7)(.3)^3(.7)^3$

(D) $1 - ({}_{10}C_3)(.3)^7(.7)^7$

(E) None of these

5 Formulae

Choose the proper formula for the given quantity.

5.1 Standard Deviation

(A) $s^2 = \dfrac{\sum_i (x_i - \overline{x})^2}{n-1}$

(B) $s = \sqrt{\dfrac{\sum_i (x_i - \overline{x})^2}{n-1}}$

(C) $\overline{x} = \dfrac{\sum_i x_i}{n}$

(D) $P(X) = {}_nC_X(p^X)(1-p)^{n-X}$

5.2 Binomial Distribution

(A) $\sigma^2 = \dfrac{\sum_i (x_i - \overline{x})^2}{n-1}$

(B) $\sigma = \sqrt{\dfrac{\sum_i (x_i - \overline{x})^2}{n-1}}$

(C) $\overline{x} = \dfrac{\sum_i x_i}{n}$

(D) $P(X) = {}_nC_X(p^X)(1-p)^{n-X}$

(E) None of these

6 Unusual Observations

For the next two questions, use the following data:

Variable	μ	σ
Age of hamsters	2 years	1 year
Speed of vehicles on a highway	70 mph	5 mph
Apples in a tree per year	800 apples	100 apples

6.1 Which observation has the greatest z-score?

(A) A five-year-old hamster

(B) A car moving at 50 miles an hour on a highway

(C) A tree producing 900 apples in a year

(D) Six hamsters and an apple

(E) None of these

6.2 *Based on the above data* which of these observations is most unusual?

(A) A five-year-old hamster

(B) A car moving at 50 miles an hour on a highway

(C) A tree producing 900 apples in a year

(D) Six hamsters and an apple

(E) None of these

7 Explain why a histogram, when compared with a frequency distribution table, is better-suited to identify the distribution of data.

8 Assume you are making an estimate based on a small sample. Explain how the coefficient of variation affects the confidence of your estimate.

9 Explain your answer to (2.2). If you can apply a binomial distribution to this situation then identify each necessary assumption. Otherwise, describe which one fails for this example.

10 Draw a normal distribution.

Answer Sheet

1.1	____	1.2	____	1.3	____	1.4	____	1.5	____
2.1	____	2.2	____	2.3	____	2.4	____	2.5	____
3.1	____	3.2	____	3.3	____	3.4	____	3.5	____
4.1	____	4.2	____	4.3	____	4.4	____	4.5	____
5.1	____	5.2	____			6.1	____	6.2	____

7 _____

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8 _____

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9 _____

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10