MDM4U - Sample Test 5 - Distributions - December 1, 2023

Name:			
Name:			

Knowledge [©]	Application 🖳	Communication	Thinking 📶	Total	Percent
25	25	22	20	92	%

Knowledge

1. A spinner has 5 sections is spun. Find the distribution and the expected value.

X	x=1 (red)	x=2 (blue)	x=3 (yellow)	x=4 (green)	x=5 (purple)
P(x)					

(a) E(x) =

2. You have a bag of 12 marbles, 5 are blue. You pull out 3 marbles without replacement. $X \sim \text{Hypergeometric} (n=12, a=5, r=3)$. Thus, E(x) = ra/n =

X	0 blue	1 blue	2 blue	3 blue
C(a,x) Blue marbles	C(,)=	C(,)=	C(,)=	C(,)=
C(n-a,r-x) Not-blue	C(,)=	C(,)=	C(,)=	C(,)=
Numerator C(a,x)*C(n-a,r-x)				
C(n,r) Total	C(,)=	C(,)=	C(,)=	C(,)=
P(x) = num / C(n,r)				

(a) When you draw out 3 marbles how many blue ones will you get on average?

/5

/8

/7

/5

(b) What is the probability of getting 0 blue marbles?

3. A spinner has 2 red spaces out of 5 total. You spin it twice. Graph the distribution. Label the axis.

 $X \sim Binomial(n=2, p = 0.4)$. Thus $q = \underline{\hspace{1cm}}$

X	0 spins red	1 spin red	2 spins red
C(n,x)	C(,)=	C(,)=	C(,)=
px	^_=	=	^=
q ^{n-x}	^_=	^_=	^=
P(x)			

0.5			
0.4			
0.3			
0.2			
0.1			
0	0	1	2

4. You are rolling a dice until you get a 6. What is the probability that it will take less than 3 rolls?

 $X \sim Geometric(p = 0.167)$, Thus q =_____

X	x=0 (1st roll)	x=1 (2 nd roll)
qx	=	=
p		
$P(x)=q^{x}p$		

(a) What is the probability of getting a 6 in less than 3 rolls?

5. For each box where it is possible: (a) sub in the values in the formula and (b) evaluate fully.

P(x=2) E(x) $X \sim Uniform (n = 7)$ $X \sim Geometric (p =$ 0.4) $X \sim Binomial (n = 6,$ p = 0.3) $X \sim HyperGeo (n = 6,$ r = 3, a = 5

6. What are the formulas found in the indicated cells of this spreadsheet?

				-	_	-	
	Α	В	С	D	E	F	G
1	Binon	nial	Dist	ribu	tion		
2	(a) Fill in n	, p and	q				
3	n	5	р	0.3	q	0.7	
4							
5	(b) Create	the pro	bability	distrib	ution fo	r 5 dice	
6	x	0	1	2	3	4	5
7	C part	1	5	10	10	5	1
8	p part	1	0.3	0.09	0.027	0.008	0.002
9	q part	0.168	0.24	0.343	0.49	0.7	1
10	P(x)	0.168	0.36	0.309	0.132	0.028	0.002
11							
12	(c) Calcula	te the I	(x) and	standa	rd devi	ation	
13	E(x)	1.5	σ	1.025			
14							
15	(d) Calcula	te thes	e proba	bilities	using s	um	
16	P(x>=3)	0.163					

F3	
B7	
B8	
B9	
B10	
B13	
D13	
B16	

/21

/9

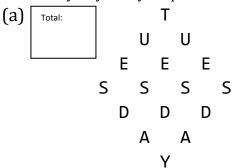


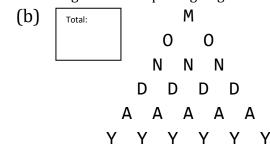
7.	W]	hich probability dis	tribution would be u	sed to solve the probl	lem?			/5
	(a)	The distribution of a standard card de		ts in a 5-card hand dea	alt from			
	(b)	The distribution fo	or rolling each side of	a 12-sided die.				
	(c)	The distribution created when you roll a die 30 times, and graph the number of 4s rolled.						
	(d)	The distribution created when you dealt cards until you get a club.						
	(e)	e) The distribution created by measuring the heights of 1023 grade 2s.						
8.	Na	me each probabilit	y distribution.					
	0.15 + 0.10 - 0.05 - 0	2 3 4 5 6 7 8 9 30 11 12 13 14 13 16 17 18 19 20 2	f(s) 1 0 a b x	C10 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	3 2 1	0 1 2 3	Ps(r) 0.25 0.29 0.11 0.13 0.10 0.15 0.1 2 3 4 5 6 7 8	9 10 2
9.	Fill	in the final column	n with the term or nu	mber indicated				/9
	(a)	A continuous distr						7
	(b)	A distribution with	n dependent trials.					
	(c)	What "x" stands fo	r in a binomial distri	bution?				
	(d)	A trial at the basis	of the Binomial distr	ibution.				
	(e)	Discrete or continu	uous variable: Length	n of a pencil.				
	(f)	Discrete or continu	uous variable: Numbe	er of eggs.				
	(g)	The sum of the 10 th	th row of Pascal's trian	ngle.				
	(h)	Another term for t	the weighted mean.					
	(i)	The distribution ty	pe for the random b	ug walk.				
10). De	fine and explain th	e importance of the t	erm "hypergeometric	distribu	tion".		 /3

Thinking
THILINING

All questions should be organized using titles. If formulas are used, they should be shown.

11. How many ways can you spell each day of the week starting from the top and going to the bottom?





/5

/6

/9

12. Why can't these be calculated? Circle the problematic value and explain why it is a problem.

$X \sim \text{Uniform (n = 2); min = 10, max = 12}$	$X \sim Binomial (n = 0.39, p = 0.39)$	$X \sim \text{HyperGeo} (n = 12, r = 14, a = 3)$	

13. In a raffle, there are 6 prize chickens worth \$100, 4 turkeys worth \$200, a pony worth \$500 and an okapi worth \$1000. 400 tickets are sold.

Item	Chicken	Turkey	Pony	Okapi	No Win	Σ
Value (x)						
Frequency						
P(x)						
x*P(x)						

What is the expected value of a ticket to the consumer?

If the raffle organizers wish to make a profit of 50% on the raffle, how much should they charge per ticket?