Chapter 5 Exam Review – Probability Distributions

MDM4U

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Section 5.1 – Probability Distributions

1) What must be the value of $P(4)$ if this is a valid probability distribution? Why?

X	$P(X)$
0	0.1
1	0.2
2	0.05
3	0.2
4	
5	0.1

2) Use the given frequency distribution to…

a) create a probability distribution for n, the number of dogs per household in a small town.

Dogs	*Households*
0	1500
1	430
2	175
3	52
4	16

n	$P(n)$

b) Determine the expected number of dogs in a home in the small town?

Section 5.2 – Hypergeometric Probability Distributions

3) The door prizes at a dance are gift certificates from local merchants. There are four \$10 certificates, five \$20 certificates, and three \$50 certificates. The prize envelopes are mixed together in a bag and are drawn at random.

a) Create a probability distribution for the number of \$50 prizes drawn, n, on the first three draws.

# of \$50 prizes drawn (n)	$\boldsymbol{P(n)}$
0	
1	
2	
3	

b) What is the expected number of \$50 certificates among the first three prizes drawn?

c) What is the probability that at least 1 \$50 prize is drawn in the first three draws?

Section 5.3 – Binomial Distributions

4) A family plans on having four children. Assuming the probability of having a boy is equal to the probability of having a girl…

a) Create a probability distribution for the number of boys, X, the family will have

# of boys (X)	$\boldsymbol{P(X)}$
0	
1	
2	
3	
4	

b) Find the expected number of boys in a family with four children

5) A basketball player has a shooting percentage of 0.450

a) Create a probability distribution table for the number of baskets made in a quarter where he takes 4 shots.

Number of Baskets Made (*X*)	**P(*X*)**
0	
1	
2	
3	
4	

b) What is the expected number of baskets made in the quarter?

6) The Choco---Latie Candies company makes candy---coated chocolates, 40% of which are red. The production line mixes the candies randomly and packages ten per box.

a) Calculate the probability that exactly 5 of the candies in a box are red.

b) Calculate the probability that fewer than 5 in a box are red.

c) Calculate the probability that at least 3 of the candies in a box are red.

7) A certain type of rocket has a failure rate of 1.5%

a) Calculate the probability of there being exactly 1 failure in 100 launches. (answer to 6 decimal places)

b) Calculate the probability that there are more than 4 failures in 100 launches (answer to 6 decimal places)

c) What is the expected number of failures in 100 launches of the rocket?

8) Suppose that 65% of the families in a town own computers. If eight families are surveyed at random…

a) What is the probability exactly 3 own a computer?

b) What is the probability that all 8 own a computer?

c) What is the probability that 6 or fewer families own a computer

d) What is the expected number of families that will own a computer.

9) A recent survey of a gas---station's customers showed that 68% paid with credit cards, 29% used debit cards, and only 3% paid with cash. During her eight---hour shift as cashier at this gas station, Serena had a total of 223 customer. What is the probability that…

a) at least 142 customers used a credit card?

b) fewer than 220 customers paid with credit or debit cards

Section 5.4 – Geometric Distributions

10) From experience, you know that the probability that you will make a sale on any given telephone call is 0.23. Find the probability…

a) On any given day, your first sale won't be until your 5^{th} call.

b) It takes less than 4 calls to make a sale

c) It takes more than 10 calls to make a sale

11) Basketball player Shaquille O'Neal makes a free throw shot about 54% of the time. Find the probability…

a) The first free throw he makes is his 3^{rd} free throw attempt

b) It takes him more than 5 attempts to make his first free throw

12) A cereal maker places a game piece in its cereal boxes. The probability of winning a prize in the game is 1 in 4. Find the probability that…

a) You win your first prize with your fourth purchase

b) It takes you fewer than 3 purchases to win a prize

Section 5.5 – Binomial Theorem

13) Find the binomial expansion of each expression in simplified form using the binomial theorem.

a) $(2x + 3)^4$

b) $(2x - 1)^4$

c) $(3x - 2y)^!$

14) In the expansion of $\left(x^3 + \frac{2}{x}\right)^8$ find:

a) The number of terms

b) The general term

c) The third term

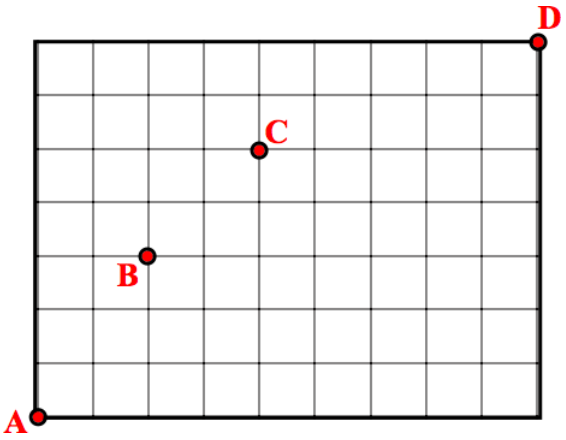
d) The constant term

15) Marshall is walking from his house to school. His route from home always takes him 4 blocks west and 9 blocks south to school but he likes to vary the path he takes.

a) How many different routes can he take?

b) If Marshall needs to stop for a coffee at the Tim Horton's that is 2 blocks west and three blocks south of his house, how many routes pass by this store?

16) The grid below shows the streets in your neighbourhood.



a) How many different routes are there to get from A to D?

b) How many different routes from A to D pass by the point B on the way?

c) What is the probability that you pass C on your way from A to D?