ALL SAINTS' COLLEGE

MATHEMATICS DEPARTMENT

Year 12 Methods - Test Number 3 - 2017
Discrete Random Variables and Binomial Distributions
Resource Free

Name: _____ **Teacher:** _____

Marks: **22**

Time Allowed: **15 minutes**

Instructions: You are NOT allowed any Calculators or notes.

You will be supplied with a formula sheet.

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1) [2,2,3 = 7 marks]

a) The table below shows the values taken by a function f(x).

x	-1	0	1	0.5
f(x)	0.2	0.6	0.1	0.1

John argues that f(x) cannot be a probability distribution function of a discrete random variable as x has a negative value. Comment on his answer.

b) The table below shows the values taken by a function f(x).

x	0	0.5	1	1.5	2
f(x)	0.2	0.5	a	b	0.1

i. Under what conditions can f(x) represent the probability distribution of a discrete random variable?

ii. If f(x) is the pdf of a discrete random variable X, find the values of a and b given that P(X=1) = P(X=1.5).

2) [3,2,2,4 = 11 marks]

A certain tropical plant produces both white and pink orchid flowers. 20% of the flowers are white. The flower colour white forms a binomial distribution. One of these plants has 3 flowers.

[Note: You do not need to simplify your answers to parts b,c and d].

(a) What are the values of n, p and q?

(b) What is the probability that all flowers are pink?

(c) What is the probability that at least 1 flower is white?

(d) What is the probability that 2 flowers are pink given that at least 1 of them is pink?

3) [4 marks]

It is know that 2% of all new electrical components produced on a mass production assembly line are defective. The components are packed in boxes of 6. Boxes are ‘passed’ only if they contain no defective items. What is the probability that a randomly chosen box is rejected?

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MATHEMATICS DEPARTMENT

Year 12 Methods - Test Number 3 - 2017

Discrete Random Variables and Binomial Distributions

Resource Rich

Name:

Teacher: _____

Marks: **45**

Time Allowed: **30 minutes**

Instructions: You are allowed a ClassPad and scientific calculator but NO notes.

You will be supplied with a formula sheet.

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1. [2,2,2,3 = 9 marks]

A probability distribution is defined by the following table:

x	0	1	2	3	4
P(X=x)	0.1	0.4	k	3k	0.06

a) Find the value of k

b) Find the P(X>2)

c) Find E[X]

d) Find the standard deviation of X

2) [1,2,3 = 6 marks]

a) What is the probability of guessing the month in which a person is born?

b) What is the percentage probability of correctly guessing the month of birth of 3 students from a group of 10 students?

c) If the probability of correctly guessing the birthday of 5 students from a group of n students is approximately 0.1595 what is the value of n?

3) [2,3,3 = 8 marks]

A certain binomial experiment has 15 trials. The probability of success in any trial is 0.315. The random variable X is the number of successes. Calculate the probability of

a) X=11

b) X is at most 9

c) X is between 5 and 8 inclusive.

4) [4,2,6 = 12 marks]

Three marbles are drawn one at a time from a bag containing 5 blue marbles and 7 green marbles. The marble is replaced after each draw. Find:

a) The probability distribution for the random variable X, the number of blue marbles drawn,

b) The probability that all three marbles were the same colour,

c) The probability that at most 1 green marble was drawn given that at least one marble was blue.

5) [4 marks]

A binomial distribution has a mean of 4.8 and a standard deviation of approximately 1.833. Find the number of trials, n, and the probability of success, p.

6) [6 marks]

The probability that Jordy tosses a coin into a container from 2 metres is 0.2.

a) If she tosses 9 coins, what is the probability of her getting at least two coins into the container?

b) How many coins would she need to toss so that the probability of getting at least 1 coin into the container is greater than 0.65?

End of Test