	Don Bosco Catholic Secondary School		
	MDM 4U1	Name:	
	Unit 3 & 4 Test Probability Distributions	Date:	
	Mr Notten, June 2015	K: /22	T: /6

Part A: Multiple-Choice

[1 K mark each]

Circle the **best possible answer**.

1. A discrete random variable X
 - a. can take any possible numerical value for each trial
 - b. represents a constant value
 - c. can only take on specific values for each outcome
 - d. can be solved for like a regular variable

2. In a dice game you roll a single dice. You win \$3 if you get a 6, \$2 if you get a 5 and lose \$1 if you get any other value. What is the expected value of this game?
 - a. \$4.00
 - b. \$ -0.17
 - c. \$ 0.17
 - d. \$24.00

3. Which of the following is **not** a requirement for a Bernoulli Trial
 - a. the probability of success is p
 - b. the probability of failure is 1-p
 - c. there are 2 or more outcomes
 - d. trials are independent

4. Which of the following is **not** an example of a Bernoulli Trial?
 - a. Rolling a die and recording the number on the dice
 - b. Rolling a die and recording the number of 6's that come up
 - c. Flipping a coin and recording the number of tails that come up
 - d. Choosing a card out of a deck of cards and recording the number of spades that come up

5. The sum of all probabilities in a probability distribution
 - a. will always be greater than 1.0
 - b. will always be less than 1.0
 - c. always equals 1.0
 - d. will be different for each type of probability distribution

6. Which of the following is a continuous probability distribution?
 - a. Binomial distribution
 - b. Geometric distribution
 - c. Hypergeometric distribution
 - d. Normal distribution

7. Which of the following has an infinite number of outcomes?
 - a. Binomial distribution
 - b. Geometric distribution
 - c. Hypergeometric distribution

8. You want to predict how many 6's are expected in 100 rolls of a dice, you should use
 - a. Binomial distribution
 - b. Geometric distribution
 - c. Hypergeometric distribution
 - d. Normal distribution

9. If you want to predict how many pitches a baseball player would have to throw before getting a hit, you should use this type of distribution. Assume each pitch is an independent trial with a fixed probability.
 - a. Binomial distribution
 - b. Geometric distribution
 - c. Hypergeometric distribution
 - d. Normal distribution

10. You record the height of each student in the class. If you want to find the probability of a student being taller than 6 feet, you would use
 - a. Binomial distribution
 - b. Geometric distribution
 - c. Hypergeometric distribution
 - d. Normal distribution

11. You can calculate the probability for getting the winning ticket in the lottery using a
- Binomial distribution
 - Geometric distribution
 - Hypergeometric distribution
 - Normal distribution
12. You can calculate how many lottery tickets you would expect to buy before winning the lottery using a
- Binomial distribution
 - Geometric distribution
 - Hypergeometric distribution
 - Normal distribution
13. You flip a coin 20 times. If you want to calculate the probability of getting all 15 heads, you should use a
- Binomial distribution
 - Geometric distribution
 - Hypergeometric distribution
 - Normal distribution
14. A bag of chips contains 18 blue chips and 12 red chips. To find the probability of selecting 6 blue chips in 10 trials (with removal), use the
- Binomial distribution
 - Geometric distribution
 - Hypergeometric distribution
 - Normal distribution

Part B: Short Answer:

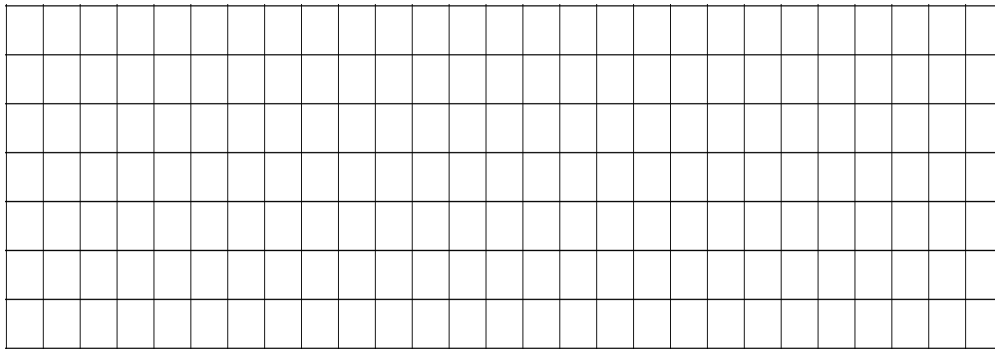
Fully answer the following questions in the space provided. Show all work.

1. You do a survey and find that 65% of Don Bosco students have iPhones. If 4 students are randomly surveyed,

a) Calculate the probability of 0, 1, 2, 3 and 4 students having iPhones: [5 K marks]

k	P(X=k)

b) Sketch the probability distribution of the above situation: [2 K marks]



c) What is the probability that 2 or more of the 4 students have iPhones? [1 K mark]

2. Mr Notten's grade 9 Math class has an average mark of 72% and a standard deviation of 9%. It can be modeled by a normal distribution. What is the probability

a) A student is failing the course? (less than 50%) [2 A marks]

b) A student has over an 85% in the course? [3 A marks]

3. A bag contains 8 red and 12 blue gumballs. 7 gumballs are chosen at random **without replacement**.

a) What is the probability that all of the chosen gumballs are blue? [3 A marks]

b) What is the probability of choosing exactly 3 red gumballs? [3 A marks]

c) How many red and how many blue gumballs would you expect to draw when choosing 7 gumballs? [2 A marks]

4. To get home from school, you need to get on the express bus. Every 4th bus that comes to the stop is an express bus.
a) How many busses would you expect to go by before an express bus comes? If a bus comes every 7 minutes, how long would you be waiting? [2 T marks]

b) What is the probability that you have to wait for 2 or fewer busses to go by before an express bus arrives? [3 T marks]

c) What is the probability that you will have to wait for more than 2 busses to go by before an express bus arrives? [1 T mark]

Unit 3 Formulas: Data Analysis

$$\bar{x} = \frac{\sum x}{n}$$

$$\bar{x} = \frac{\sum xw}{\sum w}$$

$$\sigma = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}}$$

$$z = \frac{x - \bar{x}}{\sigma}$$

Unit 4 Formulas: Probability Distributions

In General

$$E(X) = \sum xP(X = x)$$

where x is the value of the outcome and $P(X=x)$ is the probability of that outcome

Binomial Distribution

$$P(X = k) = \binom{n}{k} p^k (1 - p)^{n-k} \quad E(X) = np$$

where k is the number of successes in n independent trials

Geometric Distribution

$$P(X = x) = (1 - p)^x p \quad E(X) = \frac{1 - p}{p}$$

where x is the number of failures before a success

Hypergeometric Distribution

$$P(X = k) = \frac{\binom{a}{k} \binom{n-a}{r-k}}{\binom{n}{r}} \quad E(X) = \frac{ra}{n}$$

where k is the number of successes in r dependent trials

n is the population size and a is the number of successful outcomes in the population

