

BINOMIAL RANDOM VARIABLE

TEXT: 4.3

LAST NAME	FIRST NAME	DATE
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1 (4 points). A random experiment for this activity consists in tossing a fair twelve-sided die 5 times, then counting the number of times the die showed a number 10, 11, or 12 (success) as opposed to 1 through 9 (failure).

(a) Describe the theoretical distribution of the random variable X , which counts successes among the 5 trials in this experiment.

(b) Fill out the pmf table for X , and construct a corresponding frequency histogram:

x	$P(X = x)$
0	
1	
2	
3	
4	
5	

(c) Conduct the experiment 10 (or more) times. You will have to toss one die 50 times, or 5 dice 10 times. Fill out the following table with your empirical pmf values, and use the grid below to construct a frequency histogram for your empirical distribution.

y	tally	$P(Y = y)$
0		
1		
2		
3		
4		
5		

2 (6 points). Research indicates that in 2008 more than 97% of email messages were spam, and that 6.4% of all that spam email came from Russia. Consider a random sample of 1000 spam emails.

(a) Describe the distribution of the variable X which counts the number of emails in the sample which originated from Russia.

(b) Find the probability that exactly 60 emails in the sample originated from Russia.

(c) Find the probability that 80 or more emails in the sample originated from Russia.

(d) Find the expected value for the number of Russian spam emails in the sample.

(e) Find the standard deviation for the number of Russian spam emails in the sample.

(f) Find the z -score for a sample with $x = 80$ Russian spam emails.