

Show **all** of your work on this assignment and answer each question fully in the given context.

Please staple your assignment!

1. Ch. 5.1, Exercise 1, pg. 243 A discrete random variable  $X$  can be described using the probability function,  $f(x)$ :

x	2	3	4	5	6
f(x)	0.1	0.2	0.3	0.3	0.1

- (a) Plot  $F(x)$ , the cumulative probability function for  $X$ . [5 pts]  
 (b) Find the mean and standard deviation of  $X$ . [10 pts]
2. Ch. 5, Exercise 1, pg. 322: Suppose 90% of all students taking a beginning programming class fail to get their first program to run on first submission. Use a binomial distribution and assign probabilities to the possibilities that among a group of six such students,
- (a) all fail on their first submissions [5 pts]  
 (b) at least four fail on their first submissions [5 pts]  
 (c) less than four fail on their first submissions [5 pts]  
 Continuing to using this binomial model,  
 (d) what is the mean number who will fail? [5 pts]  
 (e) what are the variance and standard deviation of the number who will fail? [5 pts]
3. Ch. 5, Exercise 2, pg. 322: Suppose that for single launches of a space shuttle, there is a constant probability of O-ring failure (say .15), Consider ten future launches, and let  $X$  be the number of those involving an O-ring failure. Use an appropriate probability model and evaluate all of the following:
- (a) Precisely state the distribution of  $X$ , giving the values of any parameters necessary. [5 pts]  
 (b)  $P[X = 2]$  [5 pts]  
 (c)  $P[X \geq 1]$  [5 pts]  
 (d)  $EX$  [5 pts]  
 (e)  $\text{Var}X$  [5 pts]  
 (f) the standard deviation of  $X$  [5 pts]
4. Ch. 5.1, Exercise 6, pg. 244: Suppose that an eddy current nondestructive evaluation technique for identifying cracks in critical metal parts has a probability of about .20 of detecting a single crack of length .003in. in a certain material. Let  $Y$  be the number of specimens inspected in order to obtain the first crack detection. Use an appropriate probability model and evaluate all of the following:
- (a) Precisely state the distribution of  $X$ , giving the values of any parameters necessary. [5 pts]  
 (b)  $P[Y = 5]$  [5 pts]

(c)  $P[Y \leq 4]$ [5 pts]

(d)  $EY$ [5 pts]

(e)  $\text{Var}Y$ [5 pts]

(f)  $\text{SD}(Y)$ [5 pts]

Total: 100 pts