

Please write ***Your name:*** \_\_\_\_\_

**Show all work:** either write at least a sentence explaining your reasoning, or annotate your math work with brief explanations. Correct answer with no solution will give only a partial credit. There is NO need to simplify, and NO calculators are allowed. You may leave your answer in terms of sums, products, powers, factorials or binomial coefficients, and fractions.

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- (1a) If we perform **10** independent experiments, and each experiment has probability of success **0.1**, what is the probability that at least **2** of them are successful?

*Please write your answer here:*

$$\mathbb{P}(X \geq 2) =$$

- (1b) What is the Poisson approximation to the same probability?

*Please write your answer here:*

$$\mathbb{P}(X \geq 2) \approx$$

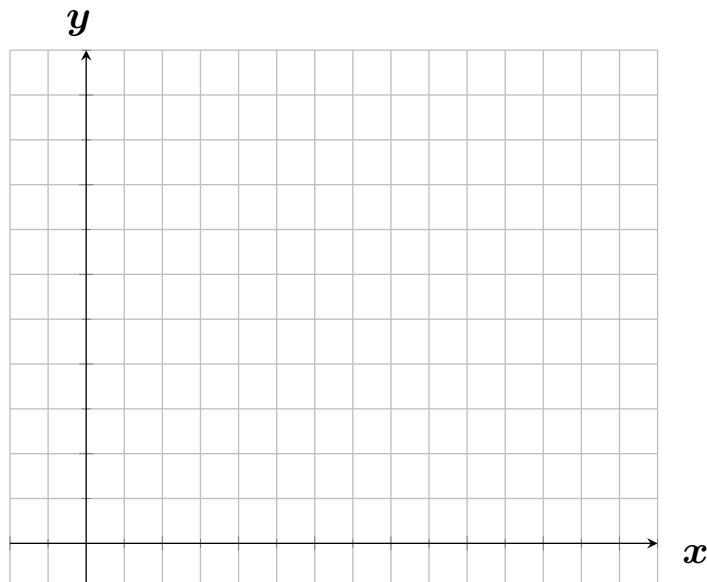
*(more questions on the next page)*

2(a) If  $\mathbf{X}$  is a Geometric random variable with  $\mathbf{p} = \frac{1}{2}$ , find  $\mathbb{P}(\mathbf{X} \geq 2 | \mathbf{X} \geq 1)$ .

*Please write your answer here:*

$$\mathbb{P}(\mathbf{X} \geq 2 | \mathbf{X} \geq 1) =$$

(2b) Plot the cumulative distribution function  $F_{\mathbf{X}}$  of  $\mathbf{X}$  using the chart provided below. Accurately label values at  $\mathbf{x}$  and  $\mathbf{y}$  axes.



*end of the quiz*