

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, factorials or binomial coefficients, and fractions.

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- (1a) Suppose that  $X$  is a random variable with the probability density given by  $f(x) = a(2x - x^2)$  when  $0 < x < 2$  and zero otherwise. Find the value of  $a$ .

Please write your answer here:

$a =$

- 1(b) Find the cumulative distribution function  $F_X$  of  $X$  using the cases provided below.

$$F_X(x) = \begin{cases} 0, & \text{for } -\infty < x < 0 \\ \text{—————}, & \text{for } 0 \leq x < 2 \\ 1 & \text{for } 2 \leq x < \infty \end{cases}$$

Please go to the next page ...

(1c) Find its expected value  $\mathbb{E}X$ .

*Please write your answer here:*

$\mathbb{E}X =$

(1d) Find the variance  $\text{Var}(X)$ .

*Please write your answer here:*

$\text{Var}(X) =$

*end of the quiz*