

Alternative reason why the CDF is nondecreasing, i.e. increasing.

If  $a < b$ , want to show  $F_X(a) \leq F_X(b)$ .

$$F_X(a) = P(X \leq a) \leq P(X \leq a) + \underbrace{P(a < X \leq b)} = P(X \leq b) = F_X(b).$$

↑  
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in fact this is  
larger than or  
equal to 0.