

The Lemma on Slide 10

(A) U is a uniform random variable

$$P_n(G^{\leftarrow}(U) \leq x) = P_n(U \leq G(x)) + P_n(U > G(x) \text{ \& } G^{\leftarrow}(U) \leq x)$$

$$G^{\leftarrow}(U) = \inf \{y \mid G(y) \geq U\} = \overline{y}$$

G is increasing and continuous so we cannot have

$$x \geq y$$

$$G(x) < U$$

so the second term ~~that part~~ is 0.

(B) This is saying that

$$P_n(G(X) \leq u) = P_n(U \leq u)$$

But G is a distribution function, continuous, so every U must have x such that $G(x) = U$.

$$\{U \mid U \leq u\} = \{U = G(x), U \leq u\}$$