proof of Inverse transform sampling

Let F be a CDF and let F^{-1} be its (pseudo) inverse. Let $U \sim \text{Uniform}(0,1)$.

$$F^{-1}(v) = \inf\{x \mid F(x) \geq v\}$$

WTS $P(F^{-1}(U) \leq x) = F(x)$

$P(F^{-1}(U) \leq x) = P(U \leq F(x))$ by applying the inverse

$= F(x)$ because $P(U \leq k) = k$ for $\text{Uniform}(0,1)$