$\mathbb{E}\left[\frac{V}{R}\right]$

$\mathbb{E}\left[\mathbb{E}\left[\frac{V}{R} \mid I\right]\right]$

$\mathbb{P}_i$

Let $X_1, \ldots, X_{m(I)}$ be the tests above the threshold.

Let $m_0(I)$ be the number of nulls among these.

Then

then $\mathbb{E}\left[\frac{V}{R}\right] = \mathbb{E}\left[\mathbb{E}\left[\frac{V}{R} \mid m_0(I), m(I)\right]\right]$

Now find the distn of

$X_i \mid i \in m_0(I), m_0(I), m(I)$.

$$X_i \mid \underbrace{i \in m_0(I),\ m_0(I) = m_0,\ m(I) = m,\ X_i > c}_{= A}$$

$$\mathbb{P}(X_i \le x \mid A) = \frac{\mathbb{P}(X_i \le x,\ A)}{\mathbb{P}(A)}$$