7.4.1 → Neyman-Pearson theorem

→ most powerful tests
  → limit scope to simple hypotheses for H_0 & H_1
  → UMP tests have highest power relative to all other α-level tests

→ Neyman-Pearson Theorem
  → A test of size α is a most powerful (i.e best critical region) iff

	Condition	Criteria		
	when sample $\in$ critical region	$\frac{L(\theta_0)}{L(\theta_1)} \leq k$	$\Rightarrow$ FTR ✗	small ratio values indicate data favors H_1
	— — — $\notin$ — — — —	$\frac{L(\theta_0)}{L(\theta_1)} \geq k$	$\Rightarrow$ R ✓	

  → Start w/ ratio of likelihoods & manipulate until a meaningful T.S emerges. This helps to determine the best critical region

$$\frac{L(\theta_0)}{L(\theta_1)} \leq k$$

7.4.2 → Uniformly most powerful tests (UMP)

→ Overview → usual scenario is when testing a simple hypothesis vs a composite hypothesis

  → In this case, an UMP test has the same best critical region for all possibilities described in H_1

→ Essentially, apply the Neyman-Pearson theory & analyze critical region to see if it changes based on different possible values under H_1

→ To get the final critical region, use $P(\text{Reject} \mid H_0) = \alpha$ to find c in $P(T.S \geq \leq c \mid H_0) = \alpha$
  ↳ use distribution knowledge