11.1b Same 4 - Step Process

1. State – H_0, H_a, α

2. Plan – Use a χ^2 goodness of fit test
   Conditions: ① Random
   ② Large Sample Size
   expected counts ≥ 5
   ③ Independent

3. Do – calculate χ^2, df, p-value

4. Conclude – same as always

Ex: Are births evenly distributed across the days of the week? A random sample of 140 births was taken.

Day:	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
Births:	13	23	24	20	27	18	15

Step 1 H_0: $P_{sun} = P_{mon} = P_{tues} = P_{wed} = P_{thu} = P_{Fri} = P_{sat} = \frac{1}{7}$
or Births are evenly distributed across the 7 days of the week

$\alpha = 0.05$

H_a: At least one of the p_i's is not $\frac{1}{7}$
or Births are Not evenly distributed.

Step 2 Use a χ^2 goodness of fit test
Conditions: 1. Random - A random sample of 140 births was taken
2. Large Sample Size?
All expected counts = $140\left(\frac{1}{7}\right) = 20 \geq 5$
3. Independent – there are more than 1400 births on the record

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Step 3

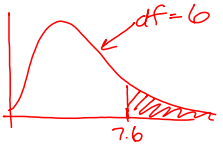
$$\chi^2 = \sum \frac{(obs-exp)^2}{exp} = \frac{(13-20)^2}{20} + \frac{(23-20)^2}{20} + \frac{(24-20)^2}{20} + \frac{(20-20)^2}{20} + \frac{(27-20)^2}{20} + \frac{(18-20)^2}{20} + \frac{(15-20)^2}{20}$$

$$= \frac{49}{20} + \frac{9}{20} + \frac{16}{20} + 0 + \frac{49}{20} + \frac{4}{20} + \frac{25}{20}$$

$$= 7.6$$

$\downarrow$

P-val = 0.269



on calc: Stat → Tests → D: χ^2GOF-test

Step 4 Since our p-value (.269) is greater than our $\alpha = 0.05$, we fail to reject the Null hypothesis. We can't conclude that births are not evenly distributed across the 7 days of the week.