

X	Y
162	166
181	147
148	182
122	143
125	169
115	155
157	157
160	156
147	145
157	171
175	139
139	179
161	134
137	180
157	145
156	141
118	188
144	137
170	132
170	180
127	182
147	182
189	161
150	143
160	139
163	124
179	118
125	152
176	176
185	112

$$m_x = \frac{1}{n} \sum_{i=1}^n x_i = 153.4$$

$$m_y = \frac{1}{n} \sum_{i=1}^n y_i = 154.5$$

$$\hat{S}_x^2 = \frac{1}{n-1} \sum_{i=1}^n (x_i - m)^2 = 423.42$$

$$\hat{S}_y^2 = \frac{1}{n-1} \sum_{i=1}^n (y_i - m)^2 = 444.53$$

$$\psi_{est} = \frac{\hat{S}_x^2}{\hat{S}_y^2} = \frac{423.42}{444.53} = 0.953$$

$$\psi_{hi} = F_{0.5\%}(29, 29) = 2.674$$

$$\psi_{lo} = \frac{1}{\psi_{hi}} = \frac{1}{2.674} = 0.374$$

$$0.374 < 0.953 < 2.674$$

$H_0$  is correct,  $m_x = m_y$  for  $\alpha = 0.01$

$$\begin{aligned}
\psi_{est} &= \frac{|m_x - m_y|}{\sqrt{\frac{(n_1-1)*\widehat{S}_x^2 + (n_2-1)*\widehat{S}_y^2}{(n_1+n_2-2)}}} * \sqrt{\frac{n_1 n_2}{n_1 + n_2}} \\
&= \frac{|153.4 - 154.5|}{\sqrt{\frac{29*423.421 + 29*444.534}{58}}} * \sqrt{\frac{30 * 30}{60}} = 0.205 \\
\psi_{hi} &= t_{0.5\%}(n_1 + n_2 - 2) = t_{0.5\%}(58) = -0.375
\end{aligned}$$