Lab 08

Part 1

(1) $t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}} = \frac{52.645 - 52}{\frac{9.368448}{\sqrt{200}}} = .973659402 = .974$

$v = 200 - 1 = 199$

Given $t = .974$ and $v = 199$, Stata reports $p = .331$.

(2) $t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}} = \frac{52.645 - 54}{\frac{9.368448}{\sqrt{200}}} = -2.045395189 = -2.045$

$v = 200 - 1 = 199$

Given $t = -2045$ and $v = 199$, Stata reports $p = 0.042$

Lab 08

Part 2

3 $$s_p^2 = \frac{(n_a-1)s_a^2 + (n_b-1)s_b^2}{n_a+n_b-2}$$

$$= \frac{(91-1)(10.30516)^2 + (109-1)(8.133715)^2}{91+109-2}$$

$$= \frac{(90)(106.1963226256) + (108)(66.1573197012)}{198}$$

$$= \frac{9557.669036304 + 7144.9905277323}{198}$$

$$= \frac{16702.6595640363}{198}$$

$$s_p^2 = 84.356866485$$

$$t = \frac{\bar{X}_a - \bar{X}_b}{\sqrt{\frac{s_p^2}{n_a} + \frac{s_p^2}{n_b}}} = \frac{50.12088 - 54.99083}{\sqrt{\frac{84.356866485}{91} + \frac{84.356866485}{109}}} = \frac{-4.86995}{\sqrt{.9269985328 + .7739162063}}$$

$$t = \frac{-4.86995}{\sqrt{1.7009147391}} = \frac{-4.86995}{1.3041912203} = -3.7340766632 = -3.734$$

$v = 91 + 109 - 2 = 198$

Given $t = -3.734$ and $v = 198$, Stata reports $p = 0.0002$

4 $$d = \frac{2t}{\sqrt{v}} = \frac{2(-3.734)}{\sqrt{198}} = -.531$$ ⟶ Moderate effect

Lab 08

Part 2

(5) $$t = \frac{\bar{X}_a - \bar{X}_b}{\sqrt{\frac{s_a^2}{n_a} + \frac{s_b^2}{n_b}}} = \frac{50.17088 - 54.99083}{\sqrt{\frac{10.30516^2}{91} + \frac{8.133715^2}{109}}} = \frac{-4.86995}{\sqrt{\frac{106.1963226256}{91} + \frac{66.1573197012}{109}}}$$

$$t = \frac{-4.86995}{\sqrt{1.1669925563 + 0.6069478872}} = \frac{-4.86995}{\sqrt{1.7739404435}} = \frac{-4.86995}{1.3318935556} = -3.6564108141$$

$$v \approx \frac{\left(\frac{s_a^2}{n_a} + \frac{s_b^2}{n_b}\right)^2}{\frac{s_a^4}{n_a^2(n_a-1)} + \frac{s_b^4}{n_b^2(n_b-1)}} = \frac{1.7739404435^2}{\frac{10.30516^4}{(91^2)(91-1)} + \frac{8.133715^4}{(109^2)(109-1)}}$$

$$v = \frac{2.8931109496}{\frac{11277.6589392005}{(8281)(90)} + \frac{4376.7909500501}{(11881)(108)}} = \frac{2.8931109496}{\frac{11277.6589392005}{745290} + \frac{4376.7909500501}{1283148}}$$

$$v = \frac{2.8931109496}{0.015131907 + 0.0034109791} = \frac{2.8931109496}{0.018542886} = 156.0226896391$$

Give $t = -3.656$ and $v = 156.023$, Stata reports $p = .0003$.

(6) $$d = \frac{2t}{\sqrt{v}} = \frac{2(-3.656)}{\sqrt{156.023}} = -0.585$$ → moderate effect

Lab 08

Part 3

7) $$t = \frac{\bar{d}}{\sqrt{\frac{s_d^2}{n}}} = \frac{.795}{\sqrt{\frac{8.293787^2}{200}}} = \frac{.795}{\sqrt{\frac{68.7869028014}{200}}} = \frac{.795}{\sqrt{.34393451 4}}$$

$$t = \frac{.795}{.5864593029} = 1.3555927854$$

Given $t = 1.356$ and $v = 198$, Stata reports $p = .177$.