Homework #11

Ben Drucker

7.3

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CI: $\overline{X} \pm t\frac{S}{\sqrt{n}} = 1584 \pm t_{19,.005}\frac{607}{\sqrt{20}} = 1584 \pm 2.861\frac{607}{\sqrt{20}} = (1195.68, 1972.32)$

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a)

$8.48 - 1.771\frac{.79}{\sqrt{14}} = 8.11$. With 95% confidence, the true mean of all joints is in the interval $(8.11, \infty)$. For an infinite number of sample confidence intervals, 95% will include the true mean. A normal distribution is assumed.

b)

$8.48 - 1.771 * .79\sqrt{1 + \frac{1}{14}} = 7.03$. If we calculate this bound for an infinite number of samples, 95% will give the lower bound for future values of a joint.

7 Supplement

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$\overline{x} = \frac{229.764+233.502}{2}231.63; t_{.025,5-1} = 2.78$
$233.502 - 229.764 = 3.74; 2 * 2.78\frac{s}{\sqrt{5}} = s \to s = \frac{\sqrt{5}*3.74}{2*2.78} = 1.51$
$t_{.005,4} = 4.604$
$231.63 \pm 4.604\frac{1.51}{\sqrt{5}} = 213.63 \pm 3.1$

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$(z_Y + z_{\alpha-Y}\frac{s}{\sqrt{n}}) \to \min(z_Y + z_{\alpha-Y}\frac{s}{\sqrt{n}}) \to \min[\Phi^{-1}(1-Y) + \Phi^{-1}(1-\alpha+Y)$.
Setting the derivative equal to 0:
$\frac{1}{\Phi(1-Y)} = \frac{1}{\Phi(1-\alpha+Y)} \Rightarrow Y = \frac{\alpha}{2}$

8.1

2

a)

Yes.

b)

No, because H_0 is not an equality claim.

c)

No, because H_a is the equality claim instead of H_0.

d)

No. $\mu_1 - \mu_2$ should appear in H_a.

e)

No because S^2 is a statistic and shouldn't be into a hypothesis.

f)

No, both H_0 and H_a can't be equality claims.

g)

Yes

h)

Yes

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Versus $H_a : \mu < 5$. In this case, the type I error should be avoided at all costs whereas the type II error is not as serious.

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$H_0 : \mu = 40; H_a : \mu \neq 40. \mu \neq 40$ is interesting for the manufacturer in either direction. A type I error would be rejected a fuse where μ is actually 40. A type 2 error would be letting a fuse through where μ is 40.