

Small-sample ($n < 30$) confidence interval for a population mean, μ (section 6.2)

A random sample of 9 Burger-Buddy hamburgers has a mean weight of 3.94 ounces and a standard deviation of 0.11 ounces. Construct a 95% confidence interval for the mean weight of a Burger-Buddy hamburger (assume that the burger weights are normally distributed).

t-Distribution

d.f.	Level of confidence, c					
	One tail, α		Two tails, α			
	0.25	0.10	0.05	0.025	0.01	0.005
1	1.000	3.078	6.314	12.706	31.821	63.657
2	.816	1.886	2.920	4.303	6.965	9.925
3	.765	1.638	2.353	3.182	4.541	5.841
4	.741	1.533	2.132	2.776	3.747	4.604
5	.727	1.476	2.015	2.571	3.365	4.032
6	.718	1.440	1.943	2.447	3.143	3.707
7	.711	1.415	1.895	2.365	2.998	3.499
8	.706	1.397	1.860	2.306	2.896	3.355
9	.703	1.383	1.833	2.262	2.821	3.250
10	.700	1.372	1.812	2.228	2.764	3.169
11	.697	1.363	1.796	2.201	2.718	3.106
12	.695	1.356	1.782	2.179	2.681	3.055
13	.694	1.350	1.771	2.160	2.650	3.012
14	.692	1.345	1.761	2.145	2.624	2.977
15	.691	1.341	1.753	2.131	2.602	2.947
16	.690	1.337	1.746	2.120	2.583	2.921
17	.689	1.333	1.740	2.110	2.567	2.898
18	.688	1.330	1.734	2.101	2.552	2.878
19	.688	1.328	1.729	2.093	2.539	2.861
20	.687	1.325	1.725	2.086	2.528	2.845
21	.686	1.323	1.721	2.080	2.518	2.831
22	.686	1.321	1.717	2.074	2.508	2.819
23	.685	1.319	1.714	2.069	2.500	2.807
24	.685	1.318	1.711	2.064	2.492	2.797
25	.684	1.316	1.708	2.060	2.485	2.787
26	.684	1.315	1.706	2.056	2.479	2.779
27	.684	1.314	1.703	2.052	2.473	2.771
28	.683	1.313	1.701	2.048	2.467	2.763
29	.683	1.311	1.699	2.045	2.462	2.756
∞	.674	1.282	1.645	1.960	2.326	2.576

$$\bar{x} \pm t \left(\frac{s}{\sqrt{n}} \right)$$

$$c = .95$$

$$d.f. = n - 1$$

$$= 9 - 1$$

$$= 8$$

$$(t = 2.306)$$

$$3.94 \pm 2.306 \left(\frac{.11}{\sqrt{9}} \right)$$

$$3.94 \pm 2.306 (.036\bar{6})$$

$$3.94 \pm .085$$

$$(3.94 - .085, 3.94 + .085)$$

$$(3.855, 4.025)$$

Small-sample ($n < 30$) hypothesis test for a population mean, μ (section 7.3)

A random sample of 9 Burger-Buddy hamburgers has a mean weight of 3.94 ounces and a standard deviation of 0.11 ounces. Does the sample provide sufficient evidence to conclude that the mean weight of a Burger-Buddy hamburger is less than 4 ounces? (test using $\alpha = .05$)

(assume that the burger weights are normally distributed)

$$H_0: \mu = 4$$

$$H_a: \mu < 4$$

Test Statistic:

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{3.94 - 4}{.11/\sqrt{9}} = \frac{-.06}{.036\bar{6}} = -1.636$$

Rejection Region:

$$t < -1.860 \quad (\text{one tail, } \alpha = .05)$$

Decision:

Do not reject H_0 (since $-1.636 \notin -1.860$)

Conclusion:

There is not sufficient evidence to conclude that mean weight of a Burger-Buddy hamburger is less than 4 ounces.