1. Find $t_{\alpha/2}$ when $n = 25$ for the 95% confidence interval for the mean.

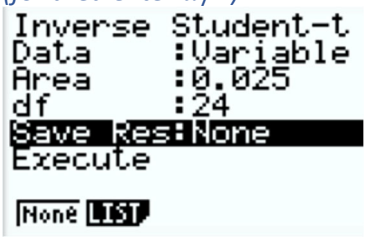
$n = 25$, therefore $df = n - 1 = 24$.
Answer: 2.064

TABLE F The *t* Distribution

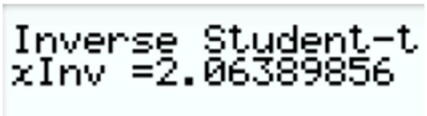
d.f.	Confidence Intervals	80%	90%	95%	98%	99%
	One tail, α	0.10	0.05	0.025	0.01	0.005
	Two tails, α	0.20	0.10	0.05	0.02	0.01
1		3.078	6.314	12.706	31.821	63.657
2		1.886	2.920	4.303	6.965	9.925
3		1.638	2.353	3.182	4.541	5.841
4		1.533	2.132	2.776	3.747	4.604
5		1.476	2.015	2.571	3.365	4.032
6		1.440	1.943	2.447	3.143	3.707
7		1.415	1.895	2.365	2.998	3.499
8		1.397	1.860	2.306	2.896	3.355
9		1.383	1.833	2.262	2.821	3.250
10		1.372	1.812	2.228	2.764	3.169
11		1.363	1.796	2.201	2.718	3.106
12		1.356	1.782	2.179	2.681	3.055
13		1.350	1.771	2.160	2.650	3.012
14		1.345	1.761	2.145	2.624	2.977
15		1.341	1.753	2.131	2.602	2.947
16		1.337	1.746	2.120	2.583	2.921
17		1.333	1.740	2.110	2.567	2.898
18		1.330	1.734	2.101	2.552	2.878
19		1.328	1.729	2.093	2.539	2.861
20		1.325	1.725	2.086	2.528	2.845
21		1.323	1.721	2.080	2.518	2.831
22		1.321	1.717	2.074	2.508	2.819
23		1.319	1.714	2.069	2.500	2.807
24		1.318	1.711	2.064	2.492	2.797
25		1.316	1.708	2.060	2.485	2.787
26		1.315	1.706	2.056	2.479	2.779
27		1.314	1.703	2.052	2.473	2.771

On Calculators: Use Inverse T

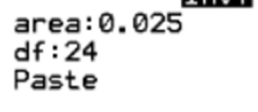
CASIO: F5 for DIST, then F2 for t and F3 for InvT:
(for area enter $\alpha/2$)



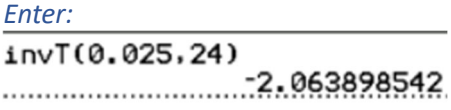
EXE



TI 84:
2nd DIST, then 4: InvT
(for area enter $\alpha/2$)



Enter:



2. A sample of size n = 10 is drawn from a normal population. Find the critical value $t_{\alpha/2}$ needed to construct a 90% confidence interval.

$n = 10$; therefore, $df = n - 1 = 9$.
Answer: 1.833

TABLE F The *t* Distribution

	Confidence Intervals	80%	90%	95%	98%	99%
	One tail, α	0.10	0.05	0.025	0.01	0.005
d.f.	Two tails, α	0.20	0.10	0.05	0.02	0.01
1		3.078	6.314	12.706	31.821	63.657
2		1.886	2.920	4.303	6.965	9.925
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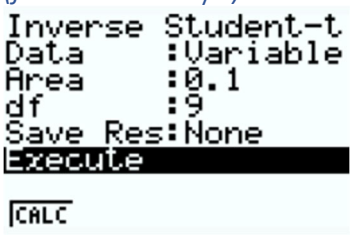
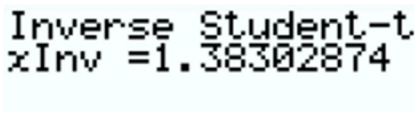
10		1.372	1.812	2.228	2.764	3.169
11		1.363	1.796	2.201	2.718	3.106
12		1.356	1.782	2.179	2.681	3.055
13		1.350	1.771	2.160	2.650	3.012

On Calculators:

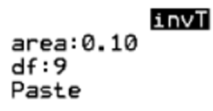
CASIO: F5 for DIST, then F2 for t and F3 for InvT:
(for area enter $\alpha/2$)



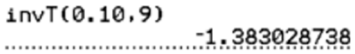
EXE



TI 84:
2nd DIST, then 4: InvT
(for area enter $\alpha/2$)



Enter:



3. A sample of size $n = 14$ has a sample mean $\bar{x}$ = 11.9 and sample standard deviation $s = 2.1$. Construct a 99% confidence interval for the population mean, μ.

$n = 14 \quad \bar{x} = 11.9 \quad s = 2.1 \quad t_{\alpha/2} = 3.012$ for $df = 13$, 99% CI

Formula: $\bar{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}}$

… substituting values into the formula: $11.9 \pm 3.012 \frac{2.1}{\sqrt{14}}$

$$(10.2,13.6) \Rightarrow 10.2 < \mu < 13.6$$

On Calculators:

CASIO: F4 for INTR, then F2 for t and F1 for 1-S:	**TI 84:**
1-Sample tInterval Data :Variable C-Level :0.99 $\bar{x}$:11.9 sx :2.1 n :14 Save Res:None None LIST *EXE* 1-Sample tInterval Left =10.2093644 Right=13.5906356 $\bar{x}$ =11.9 sx =2.1 n =14	STAT → TESTS 8: TInterval TInterval Inpt:Data Stats $\bar{x}$:11.9 Sx:2.1 n:14 C-Level:.99 Calculate *Enter:* TInterval (10.209,13.591) $\bar{x}$=11.9 Sx=2.1 n=14

4. A sample of 81 tobacco smokers who recently completed a new smoking-cessation program were asked to rate the effectiveness of the program on a scale of 1 to 10, with 10 corresponding to "completely effective" and 1 corresponding to "completely ineffective". The average rating was 5.6 and the standard deviation was 4.6. Construct a 95% confidence interval for the mean score.

$n = 81 \quad \bar{x} = 5.6 \quad s = 4.6 \quad t_{\alpha/2} = 1.99$

Formula: $\bar{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}}$

$$5.6 \pm 1.99 \frac{4.6}{\sqrt{81}}$$

$(4.6,6.6) \Rightarrow 4.6 < \mu < 6.6$

On Calculators:

CASIO: F4 for INTR, then F2 for t and F1 for 1-S:	*TI 84*:
1-Sample tInterval Data :Variable C-Level :0.95 $\bar{x}$:5.6 sx :4.6 n :81 Save Res:None None LIST *EXE* 1-Sample tInterval Left =4.58285647 Right=6.61714353 $\bar{x}$ =5.6 sx =4.6 n =81	STAT → TESTS 8: TInterval TInterval Inpt:Data Stats $\bar{x}$:5.6 Sx:4.6 n:81 C-Level:.95 Calculate *Enter:* TInterval (4.5829,6.6171) $\bar{x}$=5.6 Sx=4.6 n=81

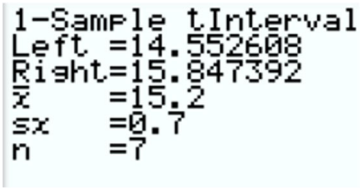
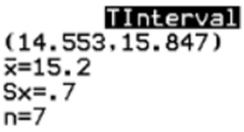
5. A food snack manufacturer samples 7 bags of pretzels off the assembly line and weighs their contents. If the sample mean is 15.2 oz. and the sample standard deviation is 0.70 oz., find the 95% confidence interval of the true mean.

$n = 7, \quad \bar{x} = 15.2 \quad s = 0.70 \quad 95\% \quad t_{\alpha/2} = 2.447$

Formula: $\bar{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}}$

$$15.2 \pm 2.447 \frac{0.70}{\sqrt{7}}$$

$(14.6, \ 15.8) \Rightarrow \ 14.6 < \mu < 15.8$

CASIO: F4 for INTR, then F2 for t and F1 for 1-S:	*TI 84*:
 *EXE* 	STAT → TESTS 8: TInterval  *Enter:* 

6. The prices (in dollars) for a graphing calculator are shown below for 8 online vendors. Estimate the true mean price for this particular calculator with 95% confidence. Sample: 130, 157, 124, 124, 145, 136, 126, 144.

Using formulas: first, find the sample mean, $\bar{x}$, and the sample standard deviation, s. Count the number of data values: 8

$\bar{x} = 135.8$

$s = 12.0$

$t_{\alpha/2} = 2.365$

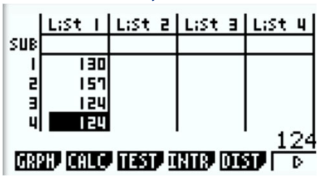
Formula: $\bar{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}}$

$$135.8 \pm 2.365 \frac{12.0}{\sqrt{8}}$$

$(125.8, \ 145.8) \Rightarrow \ 125.8 < \mu < 145.8$

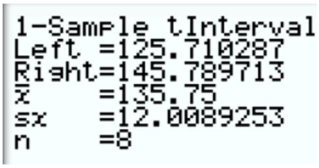
On Calculators:

CASIO: First, enter the sample data on List 1



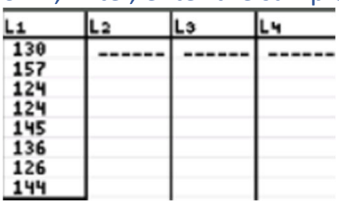
Then, F4 for INTR, then F2 for t and F1 for 1-S, then on Data press F1 to choose List

EXE



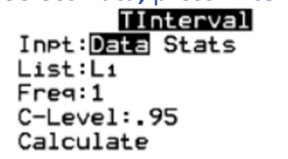
TI 84:

STAT, Enter, enter the sample data on L1

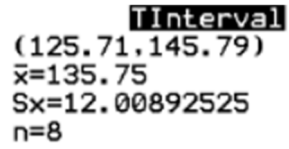


Press STAT again, go to TESTS, then 8: TInterval

Select **Data,** press Enter*:*



Enter:



7. Six measurements were made of the magnesium ion concentration (in parts per million, or ppm) in a city's municipal water supply, with the following results. It is reasonable to assume that the population is approximately normal. Sample: 175, 177, 175, 180, 138, 138. Construct a 90% confidence interval for the mean magnesium ion concentration.

   Using formulas: first, find the sample mean, $\bar{x}$, and the sample standard deviation, s. Count the number of data values: 6

   $\bar{x} = 163.8$

   $s = 20.1$

   $t_{\alpha/2} = 2.015$

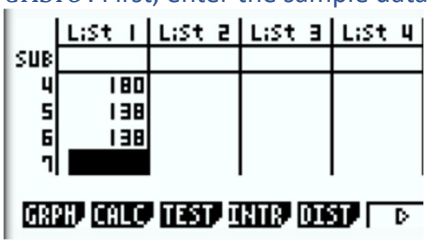
   Formula: $\bar{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}}$

   $163.8 \pm 2.015 \frac{20.1}{\sqrt{6}}$

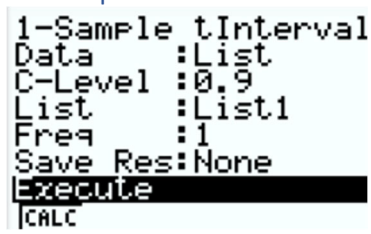
   $(147.3,\ 180.4) \Rightarrow\ 147.3 < \mu < 180.4$

On Calculators: next page

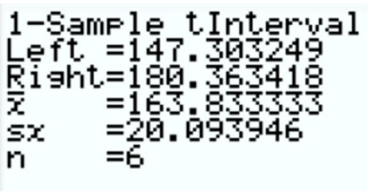
CASIO: First, enter the sample data on List 1



Then, F4 for INTR, then F2 for t and F1 for 1-S, then on Data press F1 to choose List

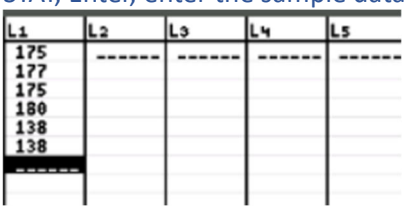


EXE



TI 84:

STAT, Enter, enter the sample data on L1



Press STAT again, go to TESTS, then 8: TInterval

Select **Data,** press Enter*:*

Enter: