1. Find the critical value $z_{\alpha/2}$ needed to construct a(n) 80% confidence interval.

Finding alpha: $1 - 0.80 = 0.20$ Therefore, $\alpha/2 = 0.10$

Check Z score table for $Z - score$ that corresponds to $\alpha/2$ (negative) or $1 - \alpha/2 = 0.90$ (positive).

−1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
−1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
−1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
−1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
−1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379

Answer: -1.28

Notice that $1 - \alpha/2 = 0.90$ corresponds to 1.28. Explain why.

1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319

On Calculators, finding critical values using Inv Norm:

*CASIO*9750:		*TI*84	
Inverse Normal Data :Variable Tail :Left Area :0.1 σ :1 μ :0 Save Res:None None LIST	Inverse Normal xInv=-1.28155516	invNorm area:0.10 μ:0 σ:1 Paste	invNorm(0.10,0,1) -1.281551567

2. A study of 55 apple trees showed that the average number of apples per tree was 725. The standard deviation of the population is 100. Which of the following is the 80% confidence interval for the mean number of apples per tree for all trees?

$n = 55 \quad \bar{x} = 725 \quad \sigma = 100 \quad 80\%\ CI$

$$\bar{x} \pm Z_{\alpha/2}\frac{\sigma}{\sqrt{n}}$$

$$725 \pm 1.28\frac{100}{\sqrt{55}}$$

$$(707.7,\quad 742.3) \approx (708,\quad 742)$$

*CASIO*9750:		*TI*84	
1. F4 for INTR 2. F1 for Z 3. F1 for 1-S 1-Sample ZInterval Data :Variable C-Level :0.8 σ :100 x̄ :725 n :55 Save Res:None None LIST	1-Sample ZInterval Left =707.719562 Right=742.280438 x̄ =725 n =55	1. Press STAT 2. TESTS 3. Select 7: Z-Interval ZInterval Inpt:Data Stats σ:100 x̄:725 n:55 C-Level:.8 Calculate	ZInterval (707.72,742.28) x̄=725 n=55

3. A college admissions officer takes a simple random sample of 80 entering freshmen and computes their mean mathematics SAT score to be 455. Assume the population standard deviation is $\sigma = 113$.

Construct a 95% confidence interval for the mean mathematics SAT score for the entering freshmen class.

$95\%CI,\ n = 80,\quad \bar{x} = 455\quad \sigma = 113$

Finding alpha: $1 - 0.95 = 0.05$

Therefore, $\alpha/2 = 0.025$

−2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
−1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
−1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294

Answer: -1.96

$\bar{x} \pm Z_{\alpha/2}\frac{\sigma}{\sqrt{n}}$

$455 \pm 1.96\frac{113}{\sqrt{80}}$

$(430, 480)$

*CASIO*9750:		*TI*84	
1. F4 for INTR 2. F1 for Z 3. F1 for 1-S 1-Sample ZInterval Data :Variable C-Level :0.95 σ :113 x̄ :455 n :80 Save Res:None None LIST	1-Sample ZInterval Left =430.238238 Right=479.761762 x̄ =455 n =80	1. Press STAT 2. TESTS 3. Select 7: Z-Interval ZInterval Inpt:Data Stats σ:113 x̄:455 n:80 C-Level:.95 Calculate	ZInterval (430.24,479.76) x̄=455 n=80

4. The three confidence intervals below were constructed from the same sample. One of them was computed at a confidence level of 90%, another at a confidence level of 95%, and another at a confidence level of 98%. Which is the confidence level at 98%?

A) $38.6 < \mu < 43.4$ B) $38.2 < \mu < 43.8$ C) $39.0 < \mu < 43.0$
D) cannot be determined

A confidence interval is a range of values around a sample statistic that is used to estimate the true population parameter with a certain level of confidence. A confidence interval gets wider as the confidence level increases.
In this question, find the difference between the two extremes: the larger difference corresponds to the 98%
For A) $43.4 - 38.6 = 4.8$ For B) $43.8 - 38.2 = 5.6$ For C) $43.0 - 39.0 = 4.0$ Answer is **B**

5. A random sample of 9 TI-89 Titanium calculators being sold over the internet had the following prices, in dollars:
   153, 146, 141, 161, 144, 152, 139, 154, 128
   Assume the population standard deviation is $\sigma = 27$ and that the population is approximately normal. Construct a 90% confidence interval for the mean price for all the TI-89's being sold over the internet.

   Answer:

   If you don't use a graphing calculator, find the sample mean, $\bar{x} = 146.4$
   The sample size, $n = 9$

   The $Z_{\alpha/2} = 1.645 \quad for \quad 90\%$ CIs

   $\bar{x} \pm Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$

   $146.6 \pm 1.645 \frac{27}{\sqrt{9}}$

   $(131.6, \quad 161.2)$

$CASIO9750$:		$TI84$	
1. Enter Data on L1 2. F4 for INTR 2. F1 for Z 3. F1 for 1-S 4. F1 for Data: list 1-Sample ZInterval Data :List C-Level :0.9 σ :27 List :List1 Freq :1 Save Res:None None LIST	1-Sample ZInterval Left =131.640762 Right=161.248127 x̄ =146.444444 sx =9.83756971 n =9	1. Enter Data on L1 2. Press STAT 2. TESTS 3. Select 7: Z-Interval 4. Select DATA 5. Press Enter ZInterval Inpt:Data Stats σ:27 List:L1 Freq:1 C-Level:.9 Calculate	ZInterval (131.64,161.25) x̄=146.4444444 Sx=9.837569709 n=9

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. Assume the population standard deviation is $\sigma = 32$.

   130, 157, 124, 124, 145, 136, 126, 144

   Answer:

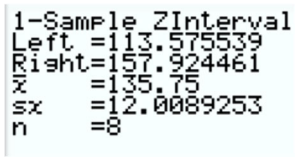
   If you don't use a graphing calculator, find the sample mean, $\bar{x} = 135.75$
   The sample size, $n = 8$
   The $Z_{\alpha/2} = 1.96$ for 95% CIs

$\bar{x} \pm Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$

$135.75 \pm 1.96 \frac{32}{\sqrt{8}}$

(113.6, 157.9)

On Graphing Calculators:

*CASIO*9750:		*TI*84	
1. Enter Data on L1 2. F4 for INTR 2. F1 for Z 3. F1 for 1-S 4. F1 for Data: list 		1. Enter Data on L1 2. Press STAT 2. TESTS 3. Select 7: Z-Interval 4. Select DATA 5. Press Enter