Ab	oe Mirza	Part 3	Practice Problems	Statistics
1.	A random sample of 36 life insurance policies was \$340 the population mean. $n = 36$ Because sample size is more th	insurance pol per year with $\overline{x} = 340$	icy holders showed that the average a standard deviation of \$24 . Const $\sigma = $ or $s = 24$	premiums paid on their life ruct a 95% confidence interval for
			- use	\$332.16 < <i>µ</i> < \$347.84
2.	A random sample of 9 life insurance policy holders showed that the average premiums paid on their life insurance policies was \$340 per year with a standard deviation of \$24. Construct a 95% confidence intervative the population mean. $n = \overline{x} = \sigma = \sigma = s = Because sample size is less than 30, then we use?$			
				\$321.55 < <i>µ</i> < \$358.45
3.	A random sample of 9 life in insurance policies was \$340 interval for the population m <i>Because sample size is less tha</i>	nsurance polic per year and nean. $n =$ an 30, then the	ey holders showed that the average p population standard deviation of \$2 $\overline{x} = \sigma = \text{or}$ n we use?	premiums paid on their life 4. Construct a 90% confidence s =
				$325.12 < \mu < 354.88$
-	Also by comparing problems 2 or smaller) and the confid	and 3, explain ence interval(by lowering the confidence level , what becomes wider or narrower)?	t happened to error (becomes larger
4.	A company that produces white bread is concerned about the distribution of the amount of sodium in its The company takes a simple random sample of 16 slices of bread and computes the sample mean to be 1 milligrams of sodium per slice. Construct a 90% confidence interval for the unknown mean sodium level assuming that the sample standard deviation is 10 milligrams. $n = \overline{x} = \sigma = \sigma r s =$			ne amount of sodium in its bread. tes the sample mean to be 100 nknown mean sodium level
	Because sample size is less th	an 30, then we	? use?	
				$95.62 < \mu < 104.38$
5.	5. The football coach randomly selected eight players and timed how long it took to perform a certain of times in minutes were: 12, 9, 13, 7, 8, 13, 16, 10. Assuming that the times follow a normal distribut 90% confidence interval for the population mean. $n = \overline{x} = \sigma = \sigma r s = Because sample size is, then we use?$			k to perform a certain drill. The llow a normal distribution, find a $\sigma = $ or $s =$
				$8.98 < \mu < 13.02$
6.	Important properties about decreasing margin of error	the relations	hip between sample size and confi	dence level and increasing and
			$E = z \frac{s}{\sqrt{n}} .$	
a) As the <i>sample size (n) decreases</i> , the <i>margin of error (E)</i>				

b) As the confidence level (C) decreases, the margin of error (E) _____

Solutions

1. A random sample of 36 life insurance policy holders showed that the average premiums paid on their life insurance policies was \$340 per year with a standard deviation of \$24. Construct a 95% confidence interval for the population mean. n = 36 $\overline{x} = 340$ s = 24Because sample size is more than 30, we use normal distribution

$$E = z\left(s / \sqrt{n}\right) = 1.96 \frac{24}{\sqrt{36}} = 7.84 \qquad \mu = 340 \pm 7.84 \qquad \$332.16 < \mu < \$347.84$$

2. A random sample of 9 life insurance policy holders showed that the average premiums paid on their life insurance policies was \$340 per year with a standard deviation of \$24. Construct a 95% confidence interval for the population mean. n = 9 $\overline{x} = 340$ s = 24Because sample size is less than 30, we use t distribution (the table) with degree of freedom of 8 and 95% confidence level and we get t = 2.306

$$E = t\left(s / \sqrt{n}\right) = 2.306 \frac{24}{\sqrt{9}} = 18.45 \qquad \mu = 340 \pm 18.45 \qquad \$321.55 < \mu < \$358.45$$

3. A random sample of **9** life insurance policy holders showed that the average premiums paid on their life insurance policies was \$340 per year and standard deviation of \$24. Construct a 90% confidence interval for the population mean. n = 9 $\overline{x} = 340$ s = 24 **Because sample size is less than 30, we use t distribution (the table) with degree of freedom of 15 and 90% confidence level and we get** t = 1.86

$$E = t\left(s / \sqrt{n}\right) = 1.86 \frac{24}{\sqrt{9}} = 14.88 \qquad \mu = 340 \pm 14.88 \qquad \$ 325.12 < \mu < \$ 354.88$$

By lowering the confidence level error becomes smaller and the confidence interval becomes narrower

4. A company that produces white bread is concerned about the distribution of the amount of sodium in its bread. The company takes a simple random sample of **16** slices of bread and computes the sample mean to be **100** milligrams of sodium per slice. Construct a **90%** confidence interval for the unknown mean sodium level assuming that the sample standard deviation is **10** milligrams.

n = 16 $\overline{x} = 100$ $\sigma =$ or s = 10Because sample size is less than 30, we use t distribution (the table) with degree of freedom of 24 and 90% confidence level and we get t = 1.86

$$E = t\left(s / \sqrt{n}\right) = 1.753 \frac{10}{\sqrt{16}} = 4.38 \qquad \mu = 100 \pm 4.38 \qquad 95.62 < \mu < 104.38$$

- 5. The football coach randomly selected eight players and timed how long it took to perform a certain drill. The times in minutes were: 12, 9, 13, 7, 8, 13, 16, 10. Assuming that the times follow a normal distribution, find a 90% confidence interval for the population mean. n = 8 $\overline{x} = 11$ s = 3.02Because sample size is less than 30, we use t distribution (the table) with degree of freedom of 9 and 90% confidence level and we get t = 1.895
 - $E = t\left(s / \sqrt{n}\right) = 1.895 \frac{3.02}{\sqrt{8}} = 2.02 \qquad \mu = 11 \pm 2.02 \qquad 8.98 < \mu < 13.02$
- 6. Important properties about the **relationship** between **sample size** and **confidence level** and *increasing and decreasing margin of error*

$$E = z \frac{s}{\sqrt{n}}$$

c) As the sample size (n) decreases, the margin of error (E) increases

d) As the confidence level (C) decreases, the margin of error (E) decreases

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