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- 1) **Millionaires.** Dr. Thomas Stanley of Georgia State University has surveyed millionaires since 1973. Among other information, Stanley obtains estimates for the mean age, μ , of all U.S. millionaires. Suppose that 36 randomly selected U.S. millionaires are the following ages, in years.

31	45	79	64	48	38	39	68	52
59	68	79	42	79	53	74	66	66
71	61	52	47	39	54	67	55	71
77	64	60	75	42	69	48	57	48

Determine a 95% confidence interval for the mean age, μ , of all U.S. millionaires. Assume that the standard deviation of the ages of all U.S. millionaires is 13.0 years. (*Note:* The mean of the data is 58.53 years.)

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- 2) **Prison Sentences.** Researchers M. Dhami et al. discussed how people adjust to prison life in the article “Adaption to Imprisonment” (*Criminal Justice and Behavior*, Vol. 34, No. 8, pp. 1085–1100). A sample of 712 federally sentenced adult male prisoners had an average sentence of 9.15 years. Assume that, for federally sentenced adult male prisoners, the population standard deviation of sentence length is 17.2 years.
- Find and interpret a 90% confidence interval for the mean sentence length, μ , of all federally sentenced adult male prisoners.
 - Find the margin of error, E .
 - Determine the sample size required to have a margin of error of 0.5 year and a 90% confidence level.
 - Find a 90% confidence interval for μ if a sample of the size determined in part (c) yields a mean of 10.1 years

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- 3) **Diamond Pricing.** In a Singapore edition of *Business Times*, diamond pricing was explored. The price of a diamond is based on the diamond's weight, color, and clarity. A simple random sample of 18 one-half-carat diamonds had the following prices, in dollars.

1676	1442	1995	1718	1826	2071	1947	1983	2146
1995	1876	2032	1988	2071	2234	2108	1941	2316

- Apply the t -interval procedure to these data to find a 90% confidence interval for the mean price of all one-half-carat diamonds. Interpret your result. (*Note:* the mean of the data is 1964.70 and the sample standard deviation is 206.50)
- Obtain a normal probability plot, a boxplot, a histogram, and a stem-and-leaf diagram of the data.
- Based on your graphs from part (b), is it reasonable to apply the t -interval procedure as you did in part (a)? Explain your answer.

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- 4) **Toxic Mushrooms?** Cadmium, a heavy metal, is toxic to animals. Mushrooms, however, are able to absorb and accumulate cadmium at high concentrations. The Czech and Slovak governments have set a safety limit for cadmium in dry vegetables at 0.5 part per million (ppm). M. Melgar et al. measured the cadmium levels in a random sample of the edible mushroom *Boletus pinicola* and published the results in the paper “Influence of Some Factors in Toxicity and Accumulation of Cd from Edible Wild Macrofungi in NW Spain” (*Journal of Environmental Science and Health*, Vol. B33(4), pp. 439– 455). Here are the data.

0.24	0.59	0.62	0.16	0.77	1.33
0.92	0.19	0.33	0.25	0.59	0.32

At the 5% significance level, do the data provide sufficient evidence to conclude that the mean cadmium level in *Boletus pinicola* mushrooms is greater than the government’s recommended limit of 0.5 ppm? Assume that the population standard deviation of cadmium levels in *Boletus pinicola* mushrooms is 0.37 ppm. (*Note:* The sum of the data is 6.31 ppm.)

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- 5) **Iron Deficiency?** Iron is essential to most life forms and to normal human physiology. It is an integral part of many proteins and enzymes that maintain good health. Recommendations for iron are provided in *Dietary Reference Intakes*, developed by the Institute of Medicine of the National Academy of Sciences. The recommended dietary allowance (RDA) of iron for adult females under the age of 51 is 18 milligrams (mg) per day. The following iron intakes, in milligrams, were obtained during a 24-hour period for 45 randomly selected adult females under the age of 51.

15.0	18.1	14.4	14.6	10.9	18.1	18.2	18.3	15.0
16.0	12.6	16.6	20.7	19.8	11.6	12.8	15.6	11.0
15.3	9.4	19.5	18.3	14.5	16.6	11.5	16.4	12.5
14.6	11.9	12.5	18.6	13.1	12.1	10.7	17.3	12.4
17.0	6.3	16.8	12.5	16.3	14.7	12.7	16.3	11.5

At the 1% significance level, do the data suggest that adult females under the age of 51 are, on average, getting less than the RDA of 18 mg of iron? Assume that the population standard deviation is 4.2 mg. (*Note:* the sample mean is 14.68mg)