STAT 327

Solutions to Assignment # 4

6.16 (a) The cumulative probability is 0.8413 for one standard deviation above the mean and 0.1587 for one standard deviation below the mean. The difference, 0.8413 − 0.1587 = 0.6826, which rounds to 0.68. **(b)** Look up *z*-scores of 2 and -2 to find cumulative probabilities 0.9772 and 0.0228, and 0.9772 − 0.0228 = 0.9544 (rounds to 0.95). **(c)** Look up *z*-scores of 3 and -3 to get cumulative probabilities of 0.9987 and 0.0013, and 0.9987 − 0.0013 = 0.9974, or roughly 1.00.

6.17 (a) 0.9495 − 0.0505 = 0.899, which rounds to 0.90
(b) 0.9951 − 0.0049 = 0.9902, which rounds to 0.99
(c) 0.7486 − 0.2514 = 0.4972, which rounds to 0.50

6.18 (a) 2.33. **(b)** The probability more than 2.33 standard deviations above the mean equals 0.01 because it is half of 0.02, the probability that it would fall beyond this *z*-score in either direction. **(c)** only 1% of the population falls above this standard deviation.

6.21 (a) 0.674; **(b)** 1.64

6.23 (a) 1.19; **(b)** 0.12; **(c)** 0.79 **(d)** 141.5

6.27 (a) (i) 0.106; **(ii)** 0.894; **(b)** 137.3; **(c)** 62.7

6.28 (a) −0.67. **(b)**Q1 = 89.3; Q3 = 110.7. **(c)**21.4 **(d)**less than 57.1 or greater than 142.9.

6.30 0.46

6.61 0.018

6.64 16.0

6.67 (a) 0.997; (b) 0.87

7.7 **(a)** bell-shaped, mean = 0.300, standard error = 0.020 **(b)** These values are only about a standard deviation from the mean, which is not unusual.

7.8 **(a)** $P(0) = 0.5, P(1) = 0.5$. **(b)** $P(0) = 0.25, P(1/2) = 0.50, P(1) = 0.25$. **(c)** $P(0) = 0.125, P(1/3) = 0.375, P(2/3) = 0.375, P(1) = 0.125$ **(d)** The distribution begins to take a bell shape.

7.12 **(a)** Assign a number, e.g. 1, to women, and another number, e.g. 0, to men. **(b)** $P(1) = 0.60$, $P(0) = 0.40$. **(c)** 0.52 for $x = 1$ (women) and 0.48 for $x = 0$ (men). **(d)** Approximately normal with mean = 0.60, and its standard error = 0.069

7.14 **(a)** Years of education. **(b)** Mean = 13.6; standard error = 0.30. **(c)** Mean = 13.6; standard error = 0.15. As n increases, the mean stays the same, the standard error decreases.

7.20 **(a)** Mean = 8.20. Standard error = 0.30. **(b)** 0.994

7.23 **(a)** X = number of people in a household, quantitative; **(b)** 2.6, 1.5; **(c)** 2.4, 1.4; **(d)** 2.6, 0.1

7.30 **(a)** Approximately normal with a mean of $p = 0.50$ and a standard error = 0.0104. **(b)** Yes; the results would be 5.8 standard deviations below the mean. **(c)** Yes, it would be too unlikely to obtain a sample proportion of 0.44 if $p = 0.50$.

7.35 **(a)** Mean = 0.70, standard error = 0.065 **(b)** bell-shaped, by Central Limit Theorem **(c)** Probability = 0.06.

7.36 **(a)** Mean = 0.1667, standard error = 0.0373. **(b)** Yes; 8.9 standard errors. **(c)** Set of 0s and 1s describing whether an American has blue eyes (1) or not (0), 17% 1s and 83% 0s; set of 50 0s and 50 1s describing whether the students in your class have blue eyes or not; probability distribution of the sample proportion, having mean = 0.1667 and standard error = 0.0373.

③

7.44 0.95

8.12 (a) 0.02. (b) 0.004. (c) 0.008. (d) (0.009, 0.025). Yes, because all values are below 0.10.

8.13 (a) 0.294. (b) 0.025. (c) (0.27, 0.32); the most believable values for the population proportion (d) Observations are obtained randomly; number of successes and the number of failures both are greater than 15. Both seem to hold true in this case.

wider. **8.23 (a)** Yes; because 0.50 falls outside of the confidence interval of 0.446 to 0.496. **(b)** No; because 0.50 falls in the confidence interval of 0.437 to 0.505. The more confident we want to be, the wider the confidence interval must be. **8.24 (a)** No, 0.50 is in the interval. **(b)** Smaller samples have larger standard errors.

8.30 (d) $df = n - 1 = 17 - 1 = 16$; 2.120 is the t-score corresponding to a 95% confidence interval with 16 degrees of freedom; **(e)** margin of error $= (2.120)(1.74) = 3.69$ so the confidence interval is $7.29 \pm 3.69 = (3.6, 11.0)$; all plausible mean weight gains are positive, but the mean could be small because the lower end point is not far from 0.

8.33 (a) The data must be produced randomly, and the population distribution should be approximately normal. **(b)** The population mean hours of TV watching is likely to be between 0.3 and 4.3. **(c)** The confidence interval is wide because of the very small sample size.

8.35 (a) Mean $= 4.14$; standard deviation $= 5.08$; standard error $= 1.92$. **(b)** (0.4, 7.9). We are 90% confident that the population mean number of hours per week spent sending and answering e-mail for women of at least age 80 is between 0.4 and 7.9 hours. **(c)** Since there will be many women of age 80 or older who do not use email at all but some who use email a lot, the distribution is likely to be skewed right. Since the confidence interval using the t-distribution is a robust method, the interval in part **(b)** should still be valid.

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8.65 Subtract and add the 1.4% margin of error from/to 82.8%. We are 95% confident that the population percentage who believe in life after death falls between 81.4% and 84.2%

8.75 (a) The first result is a 90% confidence interval for the mean hours spent per week sending and answering e-mail for males of at least age 75. The sample mean is 6.38 hours. The sample standard deviation is 6.02. These estimates are based on a sample of size 8. **(b)** The confidence interval is 2.34 to 10.41. We can be 90% confident that the population mean number of hours spent per week sending and answering email for males of at least age 75 is between 2.34 and 10.41 hours. **(c)** Since many men over the age of 75 do not use e-mail but also some use e-mail a large number of hours, this distribution is likely skewed right. Since the t-distribution is robust to violations of the normality assumption, the interval is still valid.

8.79 (a) (\$37,647, \$50,021) **(b)** an approximately normal population distribution **(c)** Not necessarily; the method is robust in terms of the normal distribution assumption.

8.86 (a) Population mean auction selling price for Palm M515 PDAs **(b)** 222.38 **(c)** $s = 23.03$, $se = 8.14$ **(d)** We can be 95% confident that the population mean auction price for the population of Palm M515 PDAs is between \$203.12 and \$241.63.