MATH 380 **HOMEWORK SOLUTION SET # 5**

5.15. (a) $\mu = 90.7$. **(d)** The center of the histogram should theoretically be close to μ.

5.16. (a) $\sigma_{\bar{x}} = \frac{1.67}{\sqrt{60}} = 0.22$. **(b)** 95% of the time, we'll expect the sample mean to be within 0.43 hours of 7.13; the 95% confidence interval is (6.6988, 7.5612). **(c)** $z = \frac{6.9 - 7.13}{0.22} = -1.05$. Using Table A, 0.15.

5.17. (a) Larger. **(b)** We need $\sigma_{\bar{x}} \leq 0.085$. **(c)** We need $n = 387$.

5.18. (a) 6.8. **(b)** 47.

5.19. The mean of the sample means will still be 250 ml. The standard deviation of the sample means will be 0.12.

5.20. (a) $n = 50$ is generally considered "large enough" for the sample mean to be approximately Normal, even for skewed distributions. The standard deviation is $\sigma_{\bar{x}} = \frac{34}{\sqrt{50}} = 4.81$. **(c)** We need $P(\bar{x} < 96.6 \text{ or } \bar{x} > 100.6)$. By symmetry, this is $2P(\bar{x} < 96.6) = 2P\left(z < \frac{96.6 - 98.6}{4.81}\right) = 2P(z < -0.42)$. Using Table A, the desired probability is $2(0.34) = 0.68$.

5.21. (b) $P = 0.7114$. **(c)** $P = 0.4006$.

5.22. (a) 394; 33.47. **(b)** $z = \frac{425 - 394}{33.47}$; $P(Z > 0.93) = 0.18$. **(c)** The mean of total number of friends in the sample is $70(394) = 27{,}580$, and the standard deviation of the total is $\sqrt{70(280)^2} = 2342.65$. **(d)** $P(T > 29{,}750) = P\left(Z > \frac{29750 - 27580}{2342.65}\right) = P(Z > 0.93) = 0.18$.

5.29. (a) A $B(200, p)$ distribution seems reasonable for this setting (even though we do not know what p is). **(b)** This setting is not binomial; there is no fixed value of n. **(c)** A $B(500, 1/12)$ distribution seems appropriate for this setting. **(d)** This is not binomial because separate cards are not independent.

5.30. (a) This is not binomial; X is not a count of successes. **(b)** A $B(20, p)$ distribution seems reasonable, where p (unknown) is the probability of a defective pair. **(c)** This should be (at least approximately) the $B(n, p)$ distribution, where n is the number of students in our sample, and p is the probability that a randomly chosen student eats at least five servings of fruits and vegetables per day. **(d)** This is not binomial. There are more than two possible values for the number of days that you skip a class during a school year.

5.31. The probability that a digit is greater than 4 is 0.5, and the probability that the digit is not greater than 5 is 0.5. **(a)** 0.9688. **(b)** $\mu = 20$.

5.32. (a) $\mu = 897$; 14.05. **(b)** 0.40. **(c)** 0. **(d)** 1100.

5.33. **(a)** $B(15, 0.25)$. **(b)** $B(15, 0.75)$, **(c)** 0.0173. **(d)** 0.0173.

5.39. **(a)** The mean is $\mu = p = 0.69$, and the standard deviation is $\sigma = \sqrt{p(1-p)/n} = 0.0008444$. **(b)** $\mu \pm 2\sigma$ gives the range 68.83% to 69.17%. **(c)** This range is considerably narrower than the historical range. In fact, 67% and 70% correspond to $z = -23.7$ and $z = 11.8$, suggesting that the observed percents do not come from an $N(0.69, 0.0008444)$ distribution; that is, the population proportion has changed over time.