AP Statistics Name______________________________________
Unit 01 – Univariate Data
Homework #5

Page 100 #12, 13, 14, 15
Page 129 #47, 50, 51, 53, 55, 57, 61

12. Cobb: z = 4.15, Williams: z = 4.26, Brett: z = 4.07. All three hitters were at least 4 standard deviations above their peers, but Williams' z-score is the highest.

13.
   a. Your bone density is far below average – about 1.5 times further below average than a typical below-average density.
   b. Solving -1.45 = (948 – 956)/σ gives σ = 5.52g/cm^2

14.
   a. Because Mary's z-score (0.5) is higher than Judy's (z = -1.45), Mary's bones are healthier when comparisons are made to other women in their age groups.
   b. Solving 0.5 = (948 – 944)/σ gives σ = 8 g/cm^2. It isn't surprising that older women have a larger standard deviation because there is more time for their good or bad health habits to have an effect, creating a wider range of bone densities.

15.
   a. He is at the 76^{th} percentile, meaning is salary is higher than 76% of his teammates.
   b. z = 0.79. Lidge's salary was 0.79 standard deviations about the mean salary.

47.
   a. 0.9978
   b. 1 – 0.9978 = 0.0022
   c. 1 – 0.0485 = 0.9593
   d. 0.9978 – 0.0485 = 0.9493

50.
   a. 0.7823 – 0.0202 = 0.7621
   b. 0.3745 – 0.1335 = 0.2410

51.
   a. z = -1.28
   b. z = 0.41

53.
   a. The length of pregnancies follows an N(266,16) distribution and we want the proportion of pregnancies that last less than 240 days. z = (240 – 266)/16 = -1.63 → 0.0516 (or 0.0521 using technology). **About 5% of pregnancies last less than 240 days, so 240 days is at the 5^{th} percentile of pregnancy lengths.**
   b. We want the proportion of pregnancies that last between 240 and 270 days.
   z = (240 – 266)/16 = -1.63 → 0.0516 and
   z = (270 – 266)/16 = 0.25 → 0.5987 so
   0.5987 – 0.0516 = 0.5471 (or 5466 using technology).
   About 55% of pregnancies last between 240 and 270 days.
   c. The longest 20% of pregnancies last longer than 279.44 days (279.47 days using technology).

55.

a. 0.0668. About 7% of the large lids are too small to fit.
b. 0 (0.0002 using technology). 0% of the large lids are too big to fit.
c. Make a larger or proportion of lids too small. If lids are too small, customers will try to just try another lid. But if lids are too large, the customer may not notice and then spill the drink.

57.

a. The manufacturer should set the mean diameter to approximately μ = 4.00 to ensure that only 1% of lids are too small.
b. A standard deviation of at most 0.013 will result in only 1% of lids that are too small to fit.
c. Reduce the standard deviation. This will reduce the number of lids that are too small and the number of lids that are too big. If we make the mean a little larger as in part (a), we will reduce the number of lids that are too small, but we will increase the number of lids that are too big.

61. Solving 1.04 = $(60 - \mu)/\sigma$ and 1.88 = $(75 - \mu)/\sigma$ gives μ = 41.43 minutes and σ = 0.4348 minutes.