

Instructions: You can complete the calculations in Excel OR by hand. If you use Excel, then you need to attach your Excel file with your submission.

1) Bob manages an apple orchard, and he's concerned that the apples seem small this year. Bob takes a random, representative sample of apples from his orchard. The weights of the sampled apples (**in grams**) are as follows:

119	121	121	123	123	123
125	125	125	125	125	
127	127	127	129	129	131

- (a)** Find the sample size.
- (b)** Find the mean apple weight for Bob's sample. Show your work or include it in your Excel file.
- (c)** Find the median apple weight for Bob's sample. Show/explain your work or include it in your Excel file.
- (d)** The standard deviation of this sample is 3.2 grams and it is roughly normally distributed.
 - i. How heavy would the apples need to be to be considered "unusually heavy" apples?
 - ii. How light would the apples need to be to be considered "unusually light" apples?Show all work. Answer with complete sentences.
- (e)** The population of apples in Bob's orchard USUALLY have an average (mean) weight of 140 grams. Given this year's sample, does it seem likely that the population of apples in Bob's orchard have a mean weight of 140 grams this year? Explain.

2) In 2004 the mean income in the U.S. was \$60,528. At the same time, the median income in the U.S. was \$43,544. Use a few complete sentences to explain why it makes sense that the mean salary is so much higher than the median.

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3) The pulse rates of adult females are normally distributed with a mean pulse rate of 78 beats per minute, and a standard deviation of 11.6 bpm. The pulse rates of adult males are normally distributed with a mean pulse rate of 67 bpm and a standard deviation of 10.3 bpm. All of these values are for people at rest (heart beat when at rest instead of exercising). Answer each of the following questions using a complete sentence:

- a) It is unusual for a female to have a resting heart rate that is MORE than _____ beats per minute.
- b) It is unusual for a male to have a resting heart rate that is MORE than _____ beats per minute.
- c) If a female has a resting heart rate of 53 beats per minute, find her z-score. Is her resting heart rate unusual? Explain.
- d) If a male has a resting heart rate of 53 beats per minute, find his z-score. Is his resting heart rate unusual? Explain.
- e) Kimberly went to the doctor who showed her a chart indicating that her resting heart rate was 2.7 standard deviations above the mean. What was her z-score? What was her heart rate? Was it an unusual heart rate? Show all work and explain using complete sentences.

4) An October 22, 2013 Gallup poll concluded (with 95% confidence) that *between 54% and 62% of Americans think that marijuana should be legalized*. Determine the estimated population proportion who think marijuana should be legalized, and determine the margin of error. Show any work.

5) Sam goes to the mall and records how long 100 random strangers (including men, women and children) can each hold their breath. Ken gathers 100 Olympic swimmers and records how long they can each hold their breath.

- a) Who do you expect will have a higher mean? Sam or Ken? Explain.
- b) Who do you expect will have a higher standard deviation? Same or Ken? Explain.