Sample responses to descriptive questions on Exam #3

The following are student responses to a few problems on Exam #3. Each of these is an example of a reasonable response.

3. Match each of A, B, and C with one of the descriptions. Explain how you reach your conclusions.

   C matches 10,00 samples of size 10: It has the correct mean at 564 and the st dev is bigger than the other with the same mean. It is also a less normal curve.
   B matches 10,00 samples of size 100: It has the correct mean of 564 and the st dev is smaller. It is also more normal than C because it has larger samples.
   A has no direct connection: This can be seen because the mean is at 1000, not 564. Therefore there is no connection.

4. (b) A friend claims that 95% of all full-term newborns have a birth weight that falls in the interval from (a). Explain why this is not correct.
   This is not correct because a confidence interval is produced by a process that has 95% probability of producing an interval containing the [population] mean. It does not tell us anything about the probability of a specific variable [value] falling into the interval produced.
   (c) Another friend claims that there is a 95% probability that the population mean is in the interval from (a). Explain why this is not correct.
   This is not correct because with confidence intervals there is no probability involved when talking about [whether or not] a mean will appear in that specific interval. The mean will either be in that interval or will not be in that interval.
   (d) Explain to your two friends what is true about the interval from (a) in relation to the value 95%.
   The interval of 3153.8 to 3362.2 grams was produced by a process that has a 95% probability of producing a interval containing the mean birth weight of [all] newborns.

5(d) List any assumptions you made in carrying out the significance test in (b).
The distribution of the population was roughly normal.
The 101 women were randomly chosen.
I assumed that the standard deviation for the diabetic women was 8.0.

6. Would you expect all of the 120 confidence intervals that get reported to contain the true value of the proportion? Explain your reasoning in reaching a conclusion.

   Response 1: *No, you would not expect all of the studies to contain the true value of the proportion. This is not to say that they all couldn't, however it is unlikely. By giving a 95% confidence interval we are saying there is a 5% (or 1 in 20) chance that the true value of the population proportion will not be contained. This works out to 6 of the 120 studies that will not contain the true population mean.*

   Response 2: *It cannot be expected that ALL 120 SRS's produced a confidence interval that included the true value of the proportion. The nature of a 95% confidence interval is that 5% of confidence intervals using our method will not be correct [in the sense of not containing the true population proportion]. It is to be expected that somewhere around 6 of the SRS's will produce confidence intervals that do not include the desired parameter value.*

7. Would the 96% confidence interval be narrower than, the same as, or wider than the 93% confidence interval? Explain your reasoning in reaching a conclusion.

   Response 1: *[The 96% confidence interval] would be wider thatn the 93% interval because it has to include more values since it was produced by a process that has a greater chance of containing the true mean. [Accompanied by figures illustrating the middle 93% and 96% areas in a normal distribution.]*

   Response 2: *The 96% confidence interval would be wider than the 93% confidence interval because the more values the interval contains, the more likely it is to contain the true parameter [value]. In a more numerical sense, the z^* value for each confidence interval increases as the confidence [level] increases. For example, z^* is 1.645 for 90% and z^* is 1.96 for 95%. Because of the formula $m = z * \sigma/\sqrt{n}$, if the σ and n are the same for both CI's, then the z^* is the only thing that changes. Multiplying a value by an increasing z^* will ultimately increase the value of the outcome, making the margin of error wider and more likely to contain the true parameter [value].*