Question 1

General Principles
1. No circular definitions (e.g., can't use the concepts to define themselves).
2. Points generally will not be awarded when an answer <u>directly</u> contradicts correct information with incorrect information.
3. Answers must be presented in sentences, and sentences must be cogent enough for the student's meaning to come through. Graphs by themselves are <u>not</u> sufficient, but annotated graphs can constitute "descriptions" or "definitions."
4. Spelling and grammar mistakes do not reduce a student's score, but spelling must be close enough so that the reader is convinced of the word in question. Mistakes in word choice are not forgiven, even if the context suggests the student wrote the wrong word by accident.
5. Assume that the student is working with a frequency distribution with scores ordered.

A. Statistics are often used to describe and interpret the results of intelligence testing.

❖ *Describe three measures of central tendency (mean, median, and mode)*

> **Point 1**: Mean
> - the average score
> - the sum of the scores divided by the (total) number of scores ($\Sigma X / N$)
>
> **Point 2**: Median
> - the middle score
> - score that divides distribution in half
>
> **Point 3**: Mode
> - the most frequent score
> - score that shows up more than others

❖ **Point 4: Describe a skewed distribution**
> - An asymmetrical distribution of scores
> Examples: "curve with a bump on the left and tail to the right"
>   "most scores are bunched to the left (or right) of the mean"
> - long tail in one direction
> - the mean is not the same as the median (or mode)
> - extreme scores pull the mean

> NOTES: a) Any description or example of a skewed distribution is OK.
>   b) Don't confuse with point #6.

> TRAP: Do not score "not normal."
>   (Distributions that are not normal can be symmetrical.)

❖ **Point 5: Relate the three measures of central tendency to a normal distribution**
> - Mean, median, and mode are the same ("very close," "very similar")

> NOTES: a) Must mention all three measures (or say "all measures")
>   b) Description of normal distribution by itself is not sufficient

median
mode
Pt #7: 55   70   85   100   115   130   145

❖ **Point 6: Relate the three measures of central tendency to a positively skewed distribution**
- The mean is the largest
- The mode or the median are smaller than the mean
- The mean is a less useful measure
- The median is more useful

NOTES: a) Must compare, at least implicitly, the measures of central tendency
 b) Assume statements about a measure are referring to its value (magnitude), not frequency.

❖ **Point 7: An intelligence test for which the scores are normally distributed has a mean of 100 and a standard deviation of 15. Use this information to describe how the scores are distributed.**
- Most scores (or 60-75%) are within 15 points of the mean (of 100)
- The typical (average, normal) IQ score falls between 85 and 115

NOTES: a) Answer must properly apply standard deviation of 15 points in computing range around mean
 ± 2 s.d. = 70 and 130; ± 3 s.d. = 55 and 145 (see normal curve figure)

 TRAP: "In this distribution, the scores range from 85 to 115" does not score.
 (Only 68% of scores are within 85 to 115, not the entire range of scores.)

❖ **Point 8: In two normal distributions, the means are 100 for group I and 115 for group II. Can an individual in group I have a higher score than the mean score for group II? Explain.**
- Answer must recognize that not all scores in a distribution are at the mean
 o There can be an overlap between the groups because someone can have a score above the mean
 o The mean is only an average, some people score above and some below

NOTE: It is possible for a score from Group I to be higher than some scores in Group II, but it is not necessary. Answer can describe non-overlapping distributions.

TRAP: "standard deviation" by itself is not sufficient, but a complete example using the concept of a standard deviation is acceptable (e.g., "Depending upon the size of the s.d., scores larger than 115 are possible.")

B. Apply knowledge of psychological research in answering the following questions about intelligence scores.

❖ **Point 9: Explain why norms for standardized intelligence tests are periodically updated.**
- Changes in *knowledge* require tests to be re-normed.
 Examples (not exhaustive):
 o People have gotten smarter (Flynn effect)
 o The number of questions answered accurately has increased over the years.
 o Changes that affect IQ test scores of groups (e.g., socio-cultural or technological)
 o Changes in educational practices or techniques (that affect knowledge)
 o Keep material culturally relevant, remove references to obsolete issues
- Re-norm to maintain validity or reliability

TRAP: changes in *social* norms alone (as opposed to *test* norms) are not reasons that test norms are updated (two different uses of the word "norm")

❖ **Point 10: Describe how to determine whether an intelligence test is biased.**
- Note that two groups (not individuals) differ on IQ test
  AND
  { specify procedure for determining potential bias **OR** provide example of a previous bias assessment }
  Examples:
  "If one group under-performs on an IQ test you must look to see if there are biased items."
  "Immigrants at Ellis Island did poorly on tests that were shown to have culturally-specific questions."
- Compare IQ test performance of various groups to their performance on a separate, unbiased measure (criterion validity test)
- The test does not <u>predict</u> accurately future performance of a group (predictive validity test)
- Compare IQ scores of two groups. If no group different exists, test is not biased.
  (e.g., "Take a random sample. If scores are similar between ethnic or other groups, the test is not biased.")

NOTES: a) Question doesn't ask <u>whether</u> a bias exists or <u>why</u> it may exist, but how to determine (how do you know) if a bias exists.
      b) A successful answer must deal with groups and not individuals.

DO NOT SCORE: a) A simple difference between two groups on an IQ test is not evidence of bias.
      b) An individual's analysis of the items on the test for face validity is not sufficient.
         <u>The test has to have been given</u> to note that two groups differ.

Question 1

Sample ZZ – 8 points (points 1, 2, 3, 4, 5, 7, 8, 9)

pt. 1:   "the sum of the data set and dividing by the number of data points"
pt. 2:   "median is the middle number"
pt. 3:   "the most common data value"
pt. 4:   "a skewed distribution will have a large number of either high or low values as compared to the mean"
pt. 5:   "the median and mode ... tend to cluster around the mean"
pt. 6:   wrong tail
pt. 7:   "the bulk of the scores on the test will be between 85 and 115"
pt. 8:   "a mean, though a generally useful measure of central tendency, says nothing about a particular score, only the entire set of data"
pt. 9:   "over time, this norm may fluctuate ... standardized test scores have risen"
pt. 10:   a non-normal distribution of scores does not provide any evidence about test bias

Sample XX – 5 points (points 1, 2, 3, 8, 9)

pt. 1:   "average of all the numbers"
pt. 2:   "middle number"
pt. 3:   "the most repeated number"
pt. 4:   "a skewed distribution follows no set pattern" does not score
pt. 5:   "so the mean will be somewhat accurate" does not score
pt. 6:   "for this the mean, median, and mode will be very accurate" does not score
pt. 7:   no point for saying that half the scores fall to either side of the mean
pt. 8:   "suppose some people scored 120 [and] several people scored in the 40s"
pt. 9:   "new technology, and more is being taught in schools"
pt. 10:   no point for saying tests must be valid and reliable

Sample YY – 1 point (point 2)

pt. 1:   "mean is the highest number" does not score
pt. 2:   "median is the middle number"
pt. 3:   "mode is the average" does not score
pts. 4-7:   no attempt
pt. 8:   "it is not possible for an individual to have a higher mean in group I than group II" does not score
pt. 9:   no point for discussion of social norms
pt. 10:   no point for list of groups that might score differently under different test conditions

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on this page as it is designated in the examination.

AP Psychology

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Statistics are often very important in quantitative data collection and analysis, particularly in standardized tests such as intelligence tests.

One important statistical measure of a group is the measures of central tendency, or averages. The three most notable are the arithmetic mean, median, and mode. The mean, which is found by taking the sum of the data set and dividing by the number of data points, is the most common form of an average. Although means are a good way to determine the general "weighted midpoint" of a set of data, they can be easily altered by a few unusually high or low data sets, and become unusually large or small. The median is the middle number in a data set sorted in ascending or descending order. On even-numbered quantities of data, the average of the two middle numbers in the sorted set is used instead. Although less affected by outliers and error in unusually high or low data points, the median is unreliable not as precise a measurement as a mean of central tendency in that it is fairly may be very high or low due to simply the frequencies of the data points. The mode is simply the most common data value in terms of frequency. For instance, the series {1, 2, 2, 3} would have a mode of two, since there are two twos and only one of the other values.

A distribution can be skewed when it deviates from the standard normal curve. A skewed distribution will have a large number of either high or low values, as compared to the mean range, and not

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predictions from standard deviation. Distributions which are unusually large compared to a normal curve are described as positively skewed, while unusually small ones are described as negatively skewed.

On a normal distribution curve, the mean will be at the apex and maximum point. Indeed, the curve is based on the mean as the midpoint. While the median and mode could possibly be just about anywhere on the curve, they tend to cluster around the mean as well, since all are measures of central tendency, or midpoint.

In contrast to this is a positively skewed distribution. In this, ~~the mean is lower than the peak of the distribution curve, to the left, and~~ the median and mode are more likely to be larger, and more in the positive direction. The mean may be in the middle of the distribution or more positive, but will not be at the apex of the curve.

The Wechsler intelligence test is a test for which the scores are normally distributed with a mean of 100 and a standard deviation of 15. This means that the bulk of the scores on the test will be between 85 and 115, about 78%, while about 93% of all scores will be between 55 and 145.

If, between two groups, the mean score for group I is lower than group II, it is still possible for an individual in group I to have tested higher than in group II. This is because a mean, though a generally useful measure of central

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tendency, says nothing about a particular score, only the entire set of data. Additionally, since means can be altered by unusually large or small data values, they are also not a fully reliable measure of even group performance, let alone individual performance. An extremely high score and an extremely low score would average out in a mean to a middling mean, and extremes can be present even in a low-mean group of data.

Periodically, norms for standardized testing are re-normed, or updated. This is because the average score on a test is supposed to be indicative of an average member of the tested population, over time, this norm may fluctuate. Indeed, over the past few years, standardized test scores have risen gradually. This may be due to a variety of factors such as increased preparation, variation between generations, and greater emphasis on test material. Since standardized tests are meant to indicate performance compared to one's peers, the average score must be altered to account for a changing target population.

Oftentimes, there have been accusations of bias against a particular group by intelligence tests. To confirm this, several things can be done. The easiest would be to try and correlate a particular group difference or trait with a negatively or positively skewed distribution. If scores on a test for a particular test group do not show
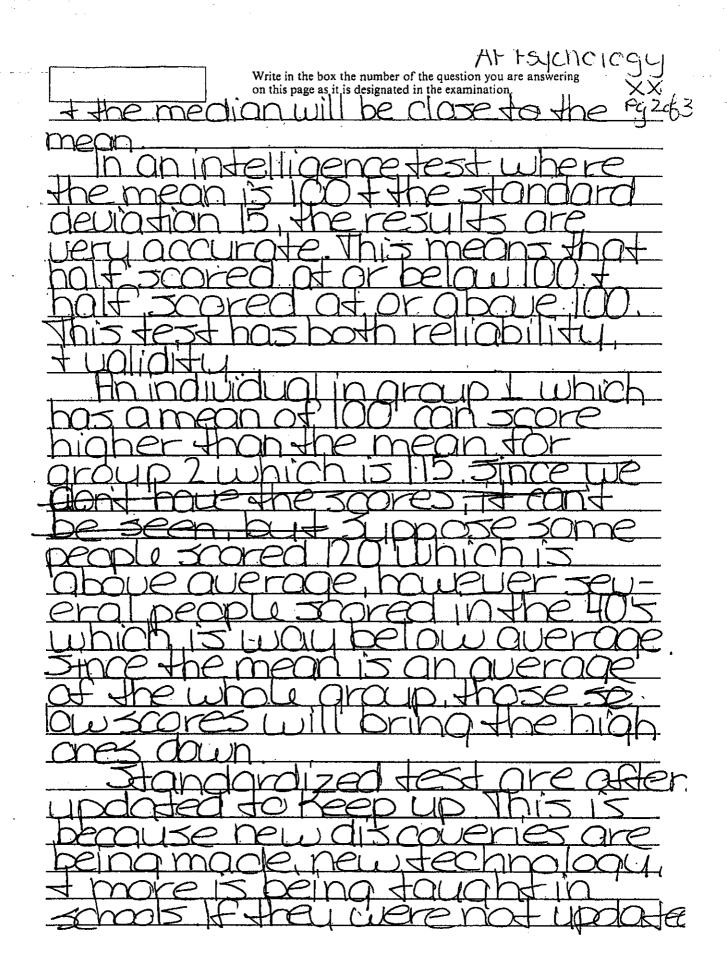
a normal distribution, a bias may be present.

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I. There are three ways to measure central tendency. They include mean, median, + mode. The mean is the average of all of the numbers. You would find this by adding up all of the numbers then dividing the sum by the amount of numbers (e.g. 9, 7, 5, 6, 5 → 9+7+5+6+5=32 → 32/5=6.4 which is the mean). The median is the middle number when put into order from least to greatest or vice versa. The mode is the most ~~fee~~ repeated number in the results.

A skewed distribution follows no set pattern. For example, a psychology classes test scores are: 50, 32, 96, 70, 64. None of these grades are related. A normal distribution will make a bell curve if graphed. For example, another Psychology classes test scores were: 60, 75, 80, 76, 61. So the ~~average~~ mean will be somewhat accurate. A positively skewed distribution is when the results are closely related (e.g. 91, 92, 94, 91). For this, the mean, median, + mode will be very accurate. On a normal distribution, the mode will not necessarily reflect the test scores.

+ the median will be close to the mean.

In an intelligence test where the mean is 100 + the standard deviation 15, the results are very accurate. This means that half scored at or below 100 + half scored at or above 100. This test has both reliability + validity.

An individual in group 1 which has a mean of 100 can score higher than the mean for group 2 which is 115. Since we ~~don't have the scores, it can't be seen, but~~ suppose some people scored 120 which is above average, however several people scored in the 40s which is way below average. Since the mean is an average of the whole group, those so low scores will bring the high ones down.

Standardized test are after updated to keep up. This is because new discoveries are being made, new technology, + more is being taught in schools. If they were not updated

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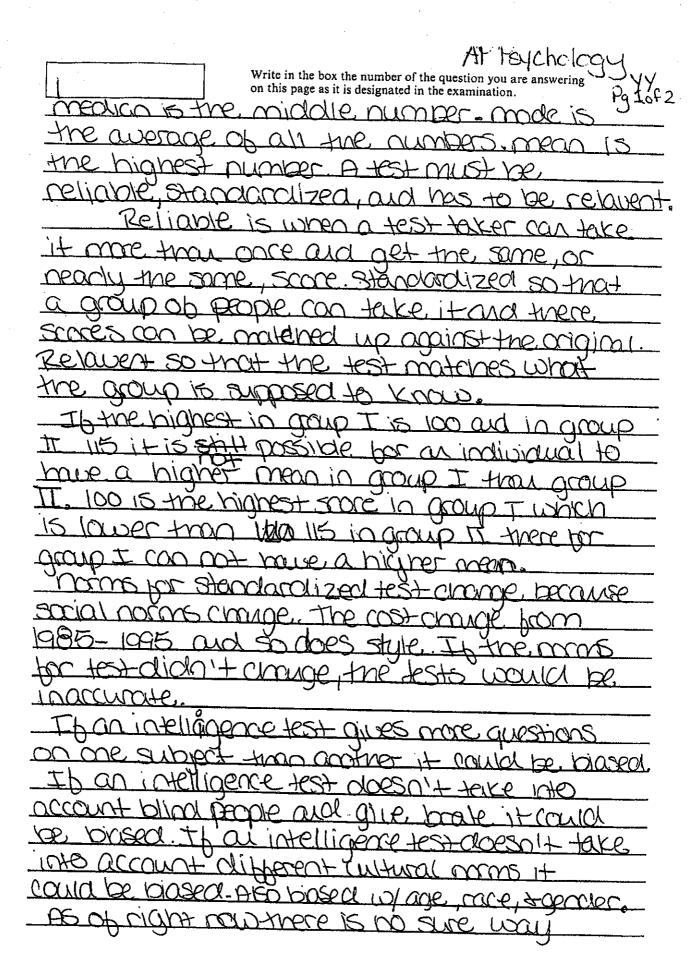they would be considered biased. Intelligence tests could be considered biased for many reasons. The main two are the validity + reliability of the test. To be accurate, it must measure correctely what is supposed to + get accurate reliable results. If an academic math test asked automobile questions it has lost its reliability + its validity. It dosen't measure math skills therefore it can't get reliable results + is biased.

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median is the middle number. mode is the average of all the numbers. mean is the highest number. A test must be reliable, standardized, and has to be relavent.

Reliable is when a test taker can take it more than once and get the same, or nearly the same, score. Standardized so that a group of people can take it and there scores can be matched up against the original. Relavent so that the test matches what the group is supposed to know.

If the highest in group I is 100 and in group II 115 it is still possible for an individual to have a higher mean in group I than group II. 100 is the highest score in group I which is lower than 115 in group II there for group I can not have a higher mean.

norms for standardized test change, because social norms change. The cost change from 1985-1995 and so does style. If the norms for test didn't change, the tests would be inaccurate.

If an intelligence test gives more questions on one subject than another it could be biased. If an intelligence test doesn't take into account blind people and give brale it could be biased. If an intelligence test doesn't take into account different cultural norms it could be biased. Also biased w/ age, race, & gender. As of right now there is no sure way

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to test intelligence, therefore
almost, if not all, intelligence tests must be
biased.