

## AP<sup>®</sup> Statistics 2000 — Scoring Guidelines

### Question 2

#### Solution

- a. The population of interest is adults who used the cave and the assumptions are:
1. the 20 measurements constitute a random sample **from the population of adults who used the cave**.
  2. the adult foot length distribution is normal or approximately normal. (Some may state this assumption as “the population distribution is normal or the sample from the population is large (e.g.,  $n > 30$ ).” This is acceptable.)
- b. **Random sample is not reasonable:** This sample was not taken from the population of interest since the anthropologists took a random sample of footprints, not a random sample of adults who used the cave. There may be several different ways to explain that the sample was not taken from the population of interest. For example:
- the 20 observations may include several footprints from the same adult
  - the footprints may be from children
  - some of the original footprints may have eroded in time

**Normality:** Either of the responses below is acceptable.

#### **Normality is not reasonable:**

1. A boxplot or an analysis of the given summary statistics can be used to show that the distribution is skewed.

OR

2. The range of the data is 21.8, which is only 2.91 standard deviations, which is smaller than would be expected for a normal distribution.

OR

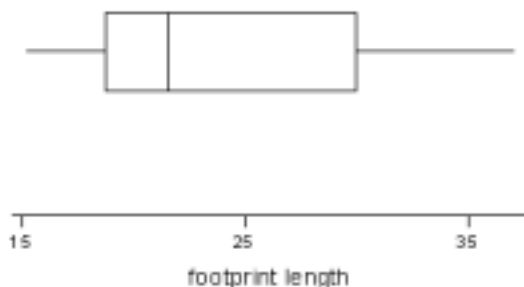
3. The minimum value is only 1.28 standard deviations below the mean, which is smaller than would be expected for a normal distribution.

OR

4. The maximum is only 1.63 standard deviations above the mean, which is smaller than would be expected for a normal distribution.

#### **Normality is reasonable:**

A boxplot shows that the distribution is not too skewed.



## *AP*<sup>®</sup> *Statistics 2000* — Scoring Guidelines

### **Question 2 continued**

#### **4 Complete Response**

States both assumptions correctly in part (a). Justifies that the random sample assumption is not met and justifies whether or not the normality assumption is met.

#### **3 Substantial Response**

States both assumptions correctly and provides a correct discussion of only one of the assumptions.

#### **2 Developing Response**

States only one of the assumptions correctly in part (a) and provides a correct discussion regarding whether or not it is met in part (b).

#### **1 Minimal Response**

States one or both of the assumptions correctly in part (a) but does not provide an adequate discussion of either assumption in part (b)

#### **0 No credit**

### **NOTES:**

- Stating only “random sample” or “SRS” is insufficient.
- Assumption 2 is normality, not “no outliers.” Stating only that “there are no outliers” is insufficient for establishing normality.
- Extraneous comments in either parts (a) or (b) should be ignored, as long as they are not contradictory to the given answer.
- If part (b) is addressed in the student’s answer to (a) and not contradicted in what is written in (b), credit can be given for (b).
- If part (a) is addressed in the student’s answer to (b) and not contradicted in what is written in (a), credit can be given for (a).
- A student can only be penalized once for failing to correctly identify the target population of interest: adults who use the cave.