AP Exam Review – Sampling and Experiments

I. Sampling

A. Population vs. Sample

a) census

B. Biased Samples

a) Convenience Sample

b) Voluntary Response Sample

C. Types of bias

a) Undercoverage

b) Nonresponse

c) Response bias

d) Wording of questions

D. Good Sampling Methods

a) Simple random sample (SRS)

b) Stratified random sample

c) Cluster sample

d) Systematic sample

If saying a sample is biased, you must tell why and explain how it would lead to an under or over estimate.

To distinguish between a stratified random and cluster sample, think:
Stratified = "some from all"
Cluster= "all from some"

II. Experiments

A. Experiment vs. Observational Study

B. Principles of Experimental Design

a) Randomization

b) Control

c) Replication

d) **COMPARISON**

C. Problems in experiments

a) Confounding

b) Placebo Effect

c) Missing any of the Principles of Experimental Design

D. Types

a) Completely Randomized Design

b) Matched-Pairs Design

c) Randomized Block Design

There are 2 types of matched-pairs design: you can give **1 subject** both treatments, or **2 similar subjects** randomly assigned to a treatment.

E. What to include when describing design:

a) Subjects/Experimental units

b) How subjects are assigned, and,

c) To which groups

d) Treatments

e) Response variable

Tips and Common Mistakes:

- When picking an SRS, think picking all names out of a hat, but you may be asked to use technology or a table of random digits as well
- If using variables, remember many values have a different statistics depending on if it is a sample or population (i.e. $\bar{x}$ *and* μ)
- Many experiments use blinding as a form of control, make sure to distinguish between single or double blinded.
- When describing confounding (lurking) variables make sure to say how they are associated with the explanatory variable **AND** how it affects the response variable.
- Remember, it is difficult if not impossible, to eliminate problems with sampling and experiment, we just hope to be aware of it to minimize as much as possible
- You can use an outline when describing and experimental design, but you must explain your outline in paragraph form. **Remember, the outline is optional, the paragraph explanation is mandatory for full credit!**
- It is highly likely you will have a free response question (more often than not, the investigative problem = most points) on designing an experiment so **practice short answer questions!**