1. The following text is taken from the paper “Do right-handers live longer”:
“13% of 20-year olds are left-handed but only 5% of those in their fifties and virtually nobody of 80 or over”. This trend with age would suggest
   a. Bias in the selection of people studied
   b. **An increase in the proportion of left-handers in recent years**
   c. Random variation
   d. A real survival disadvantage for left-handers
   a. the statement gives the % of left-handers in the population, not in a selected sample
   b. random variation would not be expected to result in a trend
   c. this is cross-sectional and not cohort data, so we cannot know if the older right-handed persons are the survivors from a cohort where there were more left-handers earlier.

2. In the paper “Accuracy of pharmaceutical advertisements in medical journals”, the authors found that “in 45 claims (44.1%; 95% CI 34.3-54.3) the promotional statement was not supported by the reference”. We can conclude from this that:
   a. A majority of claims are supported by the references given in the advertisements.
   b. A majority of claims are not supported by the references in the advertisements.
   c. At least 44.1% of claims are not supported by the references
   d. **We cannot say whether a majority or minority of claims are supported.**
   Since the 95% CI includes 50%, we cannot be confident of either a. or b.
   c. is not correct since the 95% CI tells us that at least 34.3% are not supported.

3. In the CLASS trial, a comparison of ulcer complications in the Celecoxib and NSAIDS groups had p-value .09 while a comparison of ulcer complications and symptomatic ulcers had a p-value of .02. From this information:
   a. We are confident that there is a difference in the ulcer complications in the two groups, but not confident of a difference in the combined ulcer complications and systematic ulcers.
   b. **We are confident that there is a difference in the combined ulcer complications and symptomatic ulcers in the two groups, but not confident of a difference in the ulcer complications**
   c. We are not confident of any difference in the two groups
   d. We are confident that there is a difference in the ulcer complications and a difference in the symptomatic ulcers in the two groups
   The p-value for ulcers is .09 (not significant) and for combined is .02 (significant), so only statement b. is true.

4. If a diagnostic test with high sensitivity is used to test a patient and they get a positive result, then we can say
   a. It is highly likely the patient has the disease
   b. It is highly unlikely the patient has the disease
   c. **It is likely the patient has the disease if it is prevalent in the population**
   d. If the disease is rare, we can be confident that the patient is one of the rare cases

The positive predictive value (PPV) depends not just on sensitivity but also on prevalence, and will be lower if prevalence is lower.
   a. is not necessarily true as a low prevalence will lower the PPV
   b. even low prevalence will not result in very low PPV if the sensitivity is high.
   d. low prevalence means lower PPV, so we should be less confident
5. In the article *Biochemical diagnosis of ventricular dysfunction in elderly patients in general practice*, the authors study a diagnostic test in a patient population where the prevalence of ventricular dysfunction was 15%. The properties of the test are studied using a random sample of 155 patients from this population.

a. By choosing a random sample, the authors can get approximately equal precision for the sensitivity and specificity
b. The sensitivity can be estimated more precisely than the specificity from a random sample
c. **The specificity can be estimated more precisely than the sensitivity from a random sample**
d. A stratified random sample would give better precision for sensitivity than for specificity
e. A random sample is a better choice than a stratified sample in this study.

*Since the disease is rather rare (15%) a random sample will give relatively fewer cases (approximately 15% of the 155 i.e. 23, will be cases). The information about sensitivity is based on cases and information about specificity is based on healthy persons, so the random sample has less information about sensitivity than about specificity. Thus a., b. and d. are false, c. is true, and e. is false (assuming we would like to estimate sensitivity and specificity with equal precision)*

6. The distribution of serum levels of alpha tocopherol (serum vitamin E) in a certain population is approximately normal with mean 800 µg/dL and standard deviation 200 µg/dL. The approximate reference range, within which 99% of the healthy population lie is:

a. between 400 and 1200 µg/dL
b. between 600 and 1000 µg/dL
c. **between 300 and 1300 µg/dL**
d. between 200 and 1400 µg/dL

A 99% reference range is within 2.5 SDs either side of the mean. Here 2.5XSD=500, so that the reference range is from 800-500 to 800+500 i.e. answer c.

7. With a case-control study design

a. The study may need to run for a long time for the disease to occur
b. We can study many different outcomes
c. We must begin with a disease-free group of individuals
d. **It is easy to study diseases that have a long latency**
e. We can establish the timing of exposure and disease

a. is false as case-control studies do not “run” into the future, but enrol cases and controls and collect information about their past
b. false, once we decide who the “cases” are that we wish to study, we must then study that “outcome”
c. false, cases are persons with disease and controls are persons without disease, and a case-control study begins with a group of each.
d. is true since we enrol (as cases) people who already have the disease, so we do not have to wait for the long latency period for disease to develop.
e. false, when we enrol cases who already have the disease, we often cannot know exactly when it occurred or began (e.g. sub-clinically)