For each definition, identify the correct term for the type of bias being defined. *See Collecting Data notes slide 5*

1. Participants respond differently from how they truly feel.

   *Response bias*

2. The method for selecting the participants produces a sample that does not represent the population of interest.

   *Selection bias*

3. A representative sample is chosen, but a subset of the sample cannot be contacted or does not respond.

   *Non-participation bias*
Rock singer Elvis Presley died on August 16, 1977, and his life received substantial publicity as the 25th anniversary of his death approached on August 16, 2002. Between August 7th and 11th, 2002, an ABC News poll asked a random sample of \( n=1023 \) adult Americans, "Who do you think is the greatest rock 'n' roll star of all time?" There were 128 different stars named by respondents. The top responses and the percentages they received were Elvis Presley 38%, Jimi Hendrix 4%, John Lennon 2%, Mick Jagger 2%, Bruce Springsteen 2%, Paul McCartney 2%, Eric Clapton 2%, Michael Jackson 2%, Other 25%, None 7%, No opinion 15%.

1. Was this an open- or closed-form question?

   *Open-form*

2. Do you think the respondents who answered Elvis Presley were influenced by the timing of the poll? Explain. *See Collecting Data notes slide 4 and 5*

   Yes, because of all the publicity he had just received.

3. Do you think the percentage who responded Elvis Presley would have been higher, lower, or about the same if the question had given specific choices?

   Probably lower because people who cannot think of anyone in particular, given it is an open ended question, might tend to say Elvis due to his recent news coverage. If there were answer options they might tend to remember other musicians and not select Elvis.
A news article by Reuters on October 6, 1998, reported:

In a new study, Dr. Matti Uhari and colleagues at the University of Oulu in Finland randomly gave 857 healthy children in daycare centers xylitol in syrup, gum or lozenge form or a placebo gum, syrup or lozenge in five doses per day for 3 months. According to a report in the October issue of the journal *Pediatrics* [Vol. 102, pp. 879-884, 971-972, 974-975], the incidence of ear infections was reduced by 40% in children given xylitol chewing gum, 30% in those given xylitol syrup and 20% in those given xylitol lozenges when compared to children given the respective placebo.

1. Is this an observational study or randomized experiment? *See Collecting Data notes slide 8*

   *Randomized experiment*

2. What are the explanatory and response variables? *See Correlation and Regression notes slide 2*

   *Explanatory variable: treatment received (6 different options)*
   *Response variable: number of ear infections for each child*

3. Are confounding variables likely to be a problem in this study? *See Collecting Data notes slide 4*

   *No, this is a randomized experiment*
For each of the following research scenarios, explain whether a randomized experiment could be used. See Collecting Data notes slide 8

(a) To study the relationship between long-term practice of meditation and blood pressure.

    Probably not because long-term meditation is difficult to randomly assign.

(b) To determine whether a special training program improves scores on a standard college admissions test.

    Yes, volunteers could be randomly assigned to participate in the program or not.

Answer the following questions about the above scenarios.

1. In each case, state the explanatory variable and the response variable.

   (a) explanatory: longterm practice of meditation (yes/no), response: blood pressure
   (b) explanatory: whether person took training program (yes/no), response: score on admissions test

2. In each case, give an explanation of a possible confounding variable that could be present if an observational study were done.

   (a) diet related factors (e.g. maybe those who meditate are more likely to be vegetarian, and red meat is known to increase blood pressure)
   (b) economic status (e.g. students with wealthy families have had access to better teachers, tutors and training programs, so their scores on an admissions test might be higher)

3. Why do we normally prefer to conduct a randomized experiment over an observational study?

4. Come up with a research question and describe whether it would be possible to test it with a randomized experiment. If not what type of observational study could be done?
End stage renal disease (ESRD) is a condition where the filtration performed by the kidneys has been reduced to a point at which life can no longer adequately be sustained. According to data from the National Institute of Diabetes and Digestive and Kidney Diseases over 850,000 persons in the United States are being treated for ESRD and many more suffer from early stage chronic kidney disease. The standard care for adult ESRD patients that do not have access to a viable transplant is hemodialysis. It has been hypothesized that protein-energy malnutrition (PEM) has an effect on mortality among hemodialysis patients. Serum albumin level can be seen as an indicator of nutritional status or PEM. We are interested in the effect of serum albumin on mortality. To this end 1979 hemodialysis patients were recruited. The serum albumin level was measured at recruitment alongside other demographic factors and the patients were followed for one year.

1. Is this an observational study or randomized experiment? See Collecting Data notes slide 8

   This is an observational study. The treatment / explanatory variable Serum albumin is measured/observed.

2. Is this a Case-Control study, Cohort study or Matched Pairs design? Explain. See Collecting Data notes slide 6 and 9

   Explanatory variable: treatment received (6 different combinations)
   Response variable: number of ear infections for each child

3. Remember that a confounding variable is predictive of the response and related to the explanatory variable. Are confounding variables likely to be a problem in this study? If yes, give an example of a possible confounding variable. See Collecting Data notes slide 4

   Yes, confounding is likely to be a problem. This is because this is an observational study. An example of a confounding variable would be a predictor of the response and related to the explanatory variable. Predictors of the response (time to death) might be: smoking or time on dialysis. Since dialysis depletes nutrition and serum albumin is a nutritional marker, time on dialysis can be assumed to be related to serum albumin. Time on dialysis would therefore be a confounding variable.