1.

(a)

- The treatment variable is regular exercise because that is the treatment that the group is performing to alter the outcome

- The outcome variable may be the result of an association with the treatment variable and in this case, it is lower blood pressure

- A plausible confounder is good physical health

-Physical health is a cofounder because good physical health can affect whether you regularly exercise or not. Physical health is also associated with lower blood pressure because if you are in good physical health your blood pressure is going to be lower. Regardless of whether X causes Y, good physical health could cause an association between regular exercise and lower blood pressure.

(b)

- The treatment variable is receiving a heart transplant because that is the treatment that the 60 year old patients with heart disease are receiving.

- The outcome variable may be the result of an association with the treatment variable and in this case, it is improvement in survival duration with the heart disease.

- A plausible confounder is health status of the 60 year old patients

-Health status is a cofounder because health status can affect whether you get a heart transplant and the timeline in which you get a heart transplant(association). Health status is also a confounder because it can affect how long you survive and the survival duration (association). Regardless of whether X causes Y, patients health status could cause an association between receiving a heart transplant and improvement survival duration with the heart disease.

(c)

- The treatment variable is Homework Performance because that is the treatment that the students are receiving.

- The outcome variable may be the result of an association with the treatment variable and in this case, it is better exam performance.

- A plausible confounder is amount of time used to study

-Amount of time used to study is a confounder because it can affect how you do on the homework because if you don’t study your homework scores will be low. It is also associated with exam performance because if you do not study your exam scores and performance will also be low. Regardless of whether X causes Y, amount of time used to study causes an association between homework performance and better exam performance.

(d)

- The treatment variable is regular meditation because that is treatment that the treatment group is receiving.

- The outcome variable may be the result of an association with the treatment variable and in this case it is increasing memory retention.

- A plausible confounder is peace of mind.

-Peace of mind is a possible confounder because peace of mind and having a peaceful spirit causes you to meditate more often and increasingly. Peace of mind is a possible confounder also because it increases memory retention, if your mind is at ease you are more likely to retain information. Regardless of association between X and Y, peace of mind can cause an association between regular meditation and increasing memory retention.

2.

(a) The units of analysis are the first year students, the explanatory variable is sleep duration and the outcome is the overall first year GPA

(b) The data is a sleep actigraphy

(c) I think it is an observational study because it has to do with a variable that will have serious side effects if assigned randomly so experimenters cannot perform a random experiment. They consider how setting up certain students to have lower sleep times can cause a pattern of low academic performance or low performance in other areas of life and that isn’t fair.

(d)Relying on a specific mode of data acquisition like wrist actigraphy can underestimate the time students actually sleep because technology isn’t always reliable.

(e) Daytime sleep might also impact the association they are curious about

(f)The minimum number of hours students in the study slept in order to achieve a net positive increase in baseline GPA was 6 hours

(g) One confounder is the duration of time they spend on extracurricular activities

3.

(a) The independent variable is the number of passes, and the dependent variable is the amount of goals scored.

(b) It is an observational study so there are many confounders in this experiment there is an association but because the experiment isn’t randomized it is not possible to conclude causation, it also isn’t a statistically full proof analysis because there is only a record of goals scored so it doesn’t account for a control group or the data of passes for no goals.

(c) No it does not because there are still a lot of confounders and a plethora of other factors that could possibly affect that association the evidence of an association does not imply causation like the team could have trained harder or slept more