HW3_ANS

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Load the packages we want.

```
### Quietly load all packages needed
### insert your code here
```

1. Explain your experiment

In the box below, explain your experiment. Explain your experiment. What's the idea behind your experiment, your hypothesis, study population (who did you recruit?), unit of randomization, treatment(s), and outcome metrics.

Q1 ANSWER HERE Experiment Idea: Impact of daily habits on an individual's weight.

Hypothesis: The hypothesis is that different daily habits can influence people's weight by affecting their energy intake and expenditure.

Study Population (who did you recruit?)： Classmates and family member

Unit of randomization： randomization is people will randomize answer the last two questions and it will become four part answer zone which will be TT, TF, FF, FT which is low_weight high_weight health——habit fast——food

Treatment(s)： the frequency they are eating fast food per week

Outcome metrics： People with healthy habit will generally have less weight than people with unhealthy habit

2. Analyze the data.

What was the sample size, overall mean, and overall standard deviation in your experiment?

```
### do not change anything in {}
### Here you should laod your experiment data, do any necessary data wrangling
## and calculate the requested statistics, perhaps with summary
```

Q2 WRITE-UP HERE sample size : 13 overall mean : 79.3kg overall sd : 10.6

3. test for balance

Do treatment and control look balanced?

```
### do not change anything in {}
### Calculations for balance
```

Q3 WRITE-UP HERE Not really, there are 8 in treatment and 5 in control

4. Treatment effect

Calculate the ATE And its 95% confidence interval. Is the estimate statistically significant?

```
### do not change anything in {}
### Calculations for ate
```

Q4 WRITE-UP HERE controled mean = 72 treatment mean = 83.375 ATE = 11.375 se = 4.93 ub = 21.03457359 lb = 1.715426413

5. Discuss

5. What can you conclude about your hypothesis? If the estimate is insignificant, do you have a precise zero or a noisy estimate?

Q5 WRITE-UP HERE

For people have healthy habit they have lower weight but it is not significant becuase BMI will make more sense to scale people's health show in the weight.

6. Power

What is your power to detect a 10% increase in the mean of your outcome, given your sample size?

```
### do not change anything in {}
### Calculations for power
```

Q6 WRITE-UP HERE power.t.test(n = 13, delta = 11.275, sd = 10.6, sig.level = 0.05) #74% power.t.test(n = 13, delta = 13.062, sd = 10.6, sig.level = 0.05) #85%

7. Power with a budget

Imagine that you had to pay subjects to take your experiment, at a rate of $12/hour. How many subjects would you be able to recruit with a budget of $2,000, and what would be your power to detect a 10% increase in the mean outcome? (Hint: you'll need an estimate or guess of how long it takes to complete your experiment.)

```
### do not change anything in {}
### Calculations for affordability and power
```

Q7 WRITE-UP HERE My experience tooks around 30 sec which mean .5 mins. 2000/12*3600/0.5 = I can ask 1200000 to take my experiment and power will be 1 power.t.test(n = 1200000, delta = 11.275, sd = 10.6, sig.level = 0.05)

8. Sample size calculaiton

How large a sample size would you need to detect a 10% increase in the mean of your outcome with 80% power? How much would this cost to pay your subjects? What about 95% power?

```
### do not change anything in {}
### Calculations for sample size and 80 or 95% [pwer]
```

Q8 WRITE-UP HERE power.t.test(power = 0.8, delta = 11.275, sd = 10.6, sig.level = 0.05) = n = 14.89 14.89/2/60*12 = $1.49 for 80% power

power.t.test(power = 0.95, delta = 11.275, sd = 10.6, sig.level = 0.05) = n = 29.98 23.98/2/60*12 = $2.4 for 95% power

9. Power with your sample size

Given your actual sample size, what is the minimum effect size that you can detect with 80% power? Express this as a percent of the sample mean.

```
### do not change anything in {}
### Calculations for power
```

Q9 WRITE-UP HERE result <- power.t.test(n = 15, sig.level = 0.05, power = 0.8, sd = 10.6) delta = 11.233

10. Upload your data

Did you upload your data with your canvas submission?

Q10 WRITE-UP HERE Yes