Lab5

For this lab we will be starting to think about analyzing our airplane data. Clean the `Airplane` dataset and recreate a figure similar to lab 2.

```
airplane <- read_csv("https://raw.githubusercontent.com/stat441/Labs/main/airplane_clean.csv")

airplane_wide <- airplane %>%
  mutate(value = feet_dec) %>%
  dplyr::select(-feet_dec) %>%
  pivot_wider(names_from = name, values_from = value)
```

Data Visualization

```
airplane %>%
  ggplot(aes(y = feet_dec, x = name, label = id)) +
  geom_violinhalf() +
  geom_boxplot(width=0.1) +
  geom_text(position = position_jitter(seed = 1)) +
  theme_minimal() +
  ylab('Distance traveled (feet)') +
  xlab('Airplane Type') +
  ggtitle('Airplane Distance from STAT441/541 Experiment')
```

1. Write out the statistical model suggested implied by the following code.

```
lm(feet_dec ~ name, data = airplane) %>% display()
```

```
## lm(formula = feet_dec ~ name, data = airplane)
##             coef.est coef.se
## (Intercept) 13.30     1.07
## nameGlider  -5.22     1.51
## ---
## n = 40, k = 2
## residual sd = 4.78, R-Squared = 0.24
```

2. Write out the statistical model suggested implied by the following code.

```
lm(feet_dec ~ name - 1, data = airplane) %>% display()
```

```
## lm(formula = feet_dec ~ name - 1, data = airplane)
##             coef.est coef.se
## nameDart    13.30     1.07
## nameGlider   8.08     1.07
## ---
## n = 40, k = 2
## residual sd = 4.78, R-Squared = 0.85
```

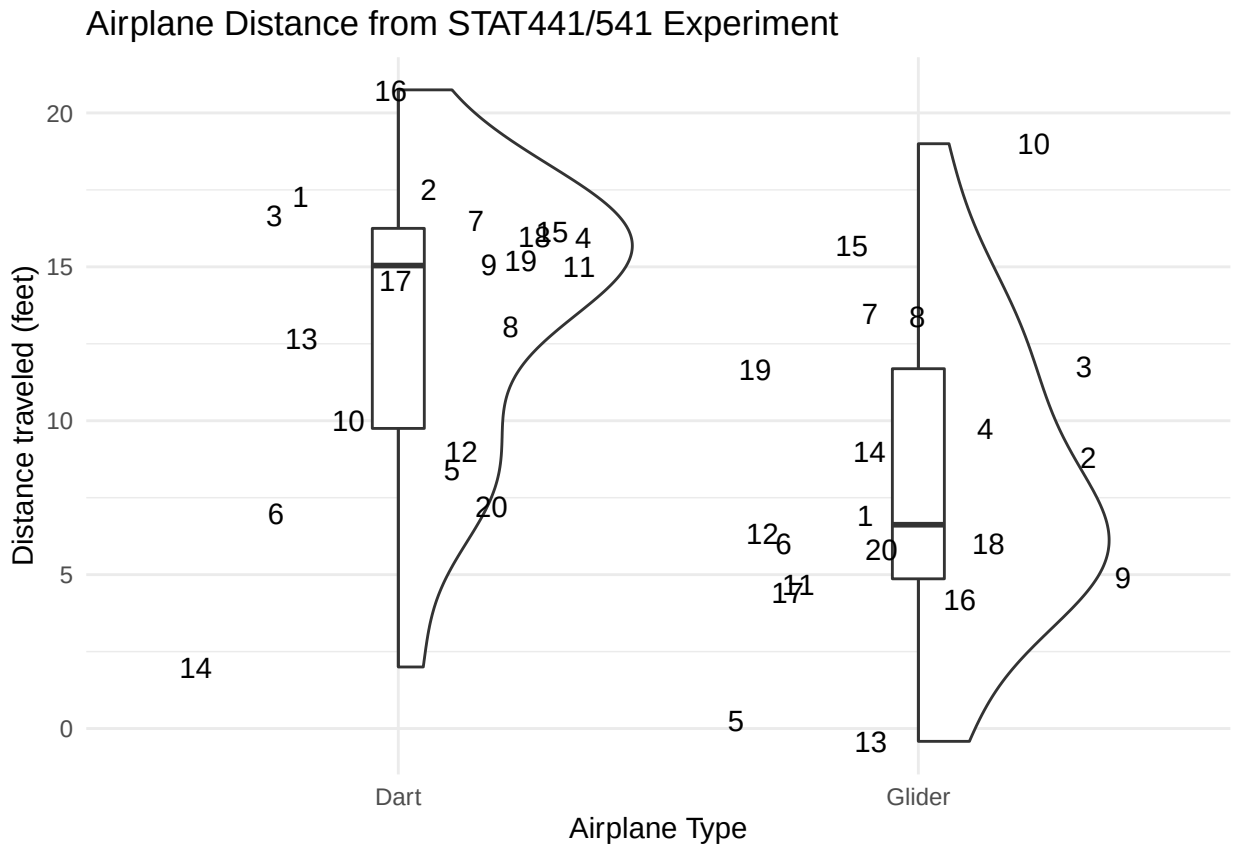

Figure 1: Distance traveled for paper airplane in STAT 441 / 541 experiment. Numbers represent unique paper airplane maker/throwers.

3. Do the statistical models in Q1 and Q2 account for the blocking structure of our designed experiment? If not, evaluate a model to include this factor using the reference case specification of Q1. Note: you don't need to write out the model notation, just fit this model.

4. Analyze the data using a paired t-test

```
#t.test(x = , y = , paired = T)
```

5. Analyze the data using a t-test on the difference (Dart - Glider) for each participant

6. Which of the analyses Q1 - Q5 provide the same inferences from the experiment?