Today, we will again be working with the Palmer penguins data frame.

Question 1

For this first question, **do not open RStudio**. Consider the relationship between bill length and bill depth when broken down by species (Adelie, Chinstrap, Gentoo). Here are some summary statistics on this information, for reference.

```
# A tibble: 3 × 5
  species  `Mean Bill Length` `SD Bill Length` `Mean Bill Depth` `SD Bill Depth`
  <fct>                 <dbl>            <dbl>             <dbl>           <dbl>
1 Adelie                 38.8             2.66              18.3           1.22
2 Chinstr…               48.8             3.34              18.4           1.14
3 Gentoo                 47.6             3.11              15.0           0.986
```

part a

Sketch a plot which can be used to summarize the relationship between the three variables. *Depict a shape which reflects your expectation of the phenomenon.* Label your axes and give the plot a title.

part b

State the aesthetic mappings and geometry involved in the plot.

Using the `penguins` data frame, answer the following questions. Where code is needed, you may write it down in the space given.

Question 2

part a
Use `lm` to fit a linear model to estimate bill depth using both bill length and species. Write the code you used below.

Question 3

Bella the penguin has a bill length of 43 millimeters. Using the linear model output, estimate her bill depth (in millimeters) in three different cases:

part a
The species of the penguin is Adelie.

part b
The species of the penguin is Chinstrap.

part c
The species of the penguin is Gentoo.

Question 4

Fit the multiple linear regression model from **Question 2**, but instead having `"Chinstrap"` as the reference level in the `species` variable. Copy the code you used to make the change of reference level (you do not need to copy the linear model code).