Homework 4

Katie Miller

2023-05-24

# Set Up

# loading in the necessary packages  
library(tidyverse)

## ── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0 ──  
## ✔ dplyr 1.1.1 ✔ readr 2.1.4  
## ✔ forcats 1.0.0 ✔ stringr 1.5.0  
## ✔ ggplot2 3.4.2 ✔ tibble 3.2.1  
## ✔ lubridate 1.9.2 ✔ tidyr 1.3.0  
## ✔ purrr 1.0.1   
## ── Conflicts ────────────────────────────────────────── tidyverse\_conflicts() ──  
## ✖ dplyr::filter() masks stats::filter()  
## ✖ dplyr::lag() masks stats::lag()  
## ℹ Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors

library(here)

## here() starts at /Users/katie/git/ENVS-193DS\_homework-04\_miller-katie

library(naniar)  
library(dplyr)

# reading in the data using here package  
fish <- read\_csv(here("data", "ntl6\_v12.csv"))

## Warning: One or more parsing issues, call `problems()` on your data frame for details,  
## e.g.:  
## dat <- vroom(...)  
## problems(dat)

## Rows: 349229 Columns: 15  
## ── Column specification ────────────────────────────────────────────────────────  
## Delimiter: ","  
## chr (8): lakeid, gearid, spname, sampletype, indid, fishpart, spseq, flag  
## dbl (5): year4, depth, rep, length, weight  
## lgl (1): sex  
## date (1): sampledate  
##   
## ℹ Use `spec()` to retrieve the full column specification for this data.  
## ℹ Specify the column types or set `show\_col\_types = FALSE` to quiet this message.

# filtering data frame to extract relevant info  
trout <- fish %>%   
 filter(spname %in% "TROUTPERCH") %>%   
 reframe(year = case\_when(spname == "TROUTPERCH" ~ year4),  
 species = case\_when(spname == "TROUTPERCH" ~ spname),  
 length = case\_when(spname == "TROUTPERCH" ~ length),  
 weight = case\_when(spname == "TROUTPERCH" ~ weight))

# Problem 1

## 1

Null: Alternative:

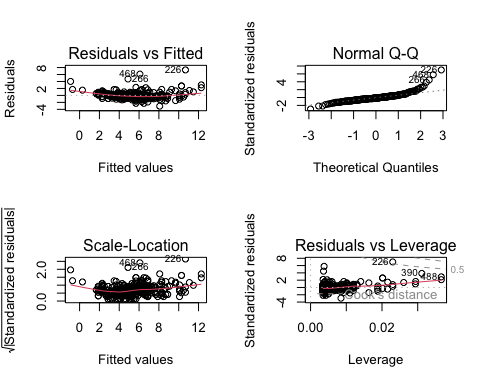
## 2

gg\_miss\_var(trout) %>%   
 theme(plot.caption = "Plot 1. Missing weights of perch trout")

## List of 2  
## $ line :List of 9  
## ..$ data : tibble [4 × 3] (S3: tbl\_df/tbl/data.frame)  
## .. ..$ variable: chr [1:4] "weight" "year" "species" "length"  
## .. ..$ n\_miss : int [1:4] 199 0 0 0  
## .. ..$ pct\_miss: num [1:4] 40.7 0 0 0  
## ..$ layers :List of 2  
## .. ..$ :Classes 'LayerInstance', 'Layer', 'ggproto', 'gg' <ggproto object: Class LayerInstance, Layer, gg>  
## aes\_params: list  
## compute\_aesthetics: function  
## compute\_geom\_1: function  
## compute\_geom\_2: function  
## compute\_position: function  
## compute\_statistic: function  
## computed\_geom\_params: NULL  
## computed\_mapping: NULL  
## computed\_stat\_params: NULL  
## constructor: call  
## data: waiver  
## draw\_geom: function  
## finish\_statistics: function  
## geom: <ggproto object: Class GeomBar, GeomRect, Geom, gg>  
## aesthetics: function  
## default\_aes: uneval  
## draw\_group: function  
## draw\_key: function  
## draw\_layer: function  
## draw\_panel: function  
## extra\_params: just na.rm orientation  
## handle\_na: function  
## non\_missing\_aes: xmin xmax ymin ymax  
## optional\_aes:   
## parameters: function  
## rename\_size: TRUE  
## required\_aes: x y  
## setup\_data: function  
## setup\_params: function  
## use\_defaults: function  
## super: <ggproto object: Class GeomRect, Geom, gg>  
## geom\_params: list  
## inherit.aes: TRUE  
## layer\_data: function  
## map\_statistic: function  
## mapping: uneval  
## position: <ggproto object: Class PositionDodge, Position, gg>  
## compute\_layer: function  
## compute\_panel: function  
## preserve: total  
## required\_aes:   
## setup\_data: function  
## setup\_params: function  
## width: NULL  
## super: <ggproto object: Class Position, gg>  
## print: function  
## setup\_layer: function  
## show.legend: NA  
## stat: <ggproto object: Class StatIdentity, Stat, gg>  
## aesthetics: function  
## compute\_group: function  
## compute\_layer: function  
## compute\_panel: function  
## default\_aes: uneval  
## dropped\_aes:   
## extra\_params: na.rm  
## finish\_layer: function  
## non\_missing\_aes:   
## optional\_aes:   
## parameters: function  
## required\_aes:   
## retransform: TRUE  
## setup\_data: function  
## setup\_params: function  
## super: <ggproto object: Class Stat, gg>  
## stat\_params: list  
## super: <ggproto object: Class Layer, gg>   
## .. ..$ :Classes 'LayerInstance', 'Layer', 'ggproto', 'gg' <ggproto object: Class LayerInstance, Layer, gg>  
## aes\_params: list  
## compute\_aesthetics: function  
## compute\_geom\_1: function  
## compute\_geom\_2: function  
## compute\_position: function  
## compute\_statistic: function  
## computed\_geom\_params: NULL  
## computed\_mapping: NULL  
## computed\_stat\_params: NULL  
## constructor: call  
## data: waiver  
## draw\_geom: function  
## finish\_statistics: function  
## geom: <ggproto object: Class GeomPoint, Geom, gg>  
## aesthetics: function  
## default\_aes: uneval  
## draw\_group: function  
## draw\_key: function  
## draw\_layer: function  
## draw\_panel: function  
## extra\_params: na.rm  
## handle\_na: function  
## non\_missing\_aes: size shape colour  
## optional\_aes:   
## parameters: function  
## rename\_size: FALSE  
## required\_aes: x y  
## setup\_data: function  
## setup\_params: function  
## use\_defaults: function  
## super: <ggproto object: Class Geom, gg>  
## geom\_params: list  
## inherit.aes: TRUE  
## layer\_data: function  
## map\_statistic: function  
## mapping: uneval  
## position: <ggproto object: Class PositionIdentity, Position, gg>  
## compute\_layer: function  
## compute\_panel: function  
## required\_aes:   
## setup\_data: function  
## setup\_params: function  
## super: <ggproto object: Class Position, gg>  
## print: function  
## setup\_layer: function  
## show.legend: NA  
## stat: <ggproto object: Class StatIdentity, Stat, gg>  
## aesthetics: function  
## compute\_group: function  
## compute\_layer: function  
## compute\_panel: function  
## default\_aes: uneval  
## dropped\_aes:   
## extra\_params: na.rm  
## finish\_layer: function  
## non\_missing\_aes:   
## optional\_aes:   
## parameters: function  
## required\_aes:   
## retransform: TRUE  
## setup\_data: function  
## setup\_params: function  
## super: <ggproto object: Class Stat, gg>  
## stat\_params: list  
## super: <ggproto object: Class Layer, gg>   
## ..$ scales :Classes 'ScalesList', 'ggproto', 'gg' <ggproto object: Class ScalesList, gg>  
## add: function  
## clone: function  
## find: function  
## get\_scales: function  
## has\_scale: function  
## input: function  
## n: function  
## non\_position\_scales: function  
## scales: list  
## super: <ggproto object: Class ScalesList, gg>   
## ..$ mapping :List of 1  
## .. ..$ x: language ~stats::reorder(variable, n\_miss)  
## .. .. ..- attr(\*, ".Environment")=<environment: 0x7f941925aa48>   
## .. ..- attr(\*, "class")= chr "uneval"  
## ..$ theme :List of 97  
## .. ..$ line :List of 6  
## .. .. ..$ colour : chr "black"  
## .. .. ..$ linewidth : num 0.5  
## .. .. ..$ linetype : num 1  
## .. .. ..$ lineend : chr "butt"  
## .. .. ..$ arrow : logi FALSE  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_line" "element"  
## .. ..$ rect :List of 5  
## .. .. ..$ fill : chr "white"  
## .. .. ..$ colour : chr "black"  
## .. .. ..$ linewidth : num 0.5  
## .. .. ..$ linetype : num 1  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_rect" "element"  
## .. ..$ text :List of 11  
## .. .. ..$ family : chr ""  
## .. .. ..$ face : chr "plain"  
## .. .. ..$ colour : chr "black"  
## .. .. ..$ size : num 11  
## .. .. ..$ hjust : num 0.5  
## .. .. ..$ vjust : num 0.5  
## .. .. ..$ angle : num 0  
## .. .. ..$ lineheight : num 0.9  
## .. .. ..$ margin : 'margin' num [1:4] 0points 0points 0points 0points  
## .. .. .. ..- attr(\*, "unit")= int 8  
## .. .. ..$ debug : logi FALSE  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ title : NULL  
## .. ..$ aspect.ratio : NULL  
## .. ..$ axis.title : NULL  
## .. ..$ axis.title.x :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : NULL  
## .. .. ..$ size : NULL  
## .. .. ..$ hjust : NULL  
## .. .. ..$ vjust : num 1  
## .. .. ..$ angle : NULL  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : 'margin' num [1:4] 2.75points 0points 0points 0points  
## .. .. .. ..- attr(\*, "unit")= int 8  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ axis.title.x.top :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : NULL  
## .. .. ..$ size : NULL  
## .. .. ..$ hjust : NULL  
## .. .. ..$ vjust : num 0  
## .. .. ..$ angle : NULL  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : 'margin' num [1:4] 0points 0points 2.75points 0points  
## .. .. .. ..- attr(\*, "unit")= int 8  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ axis.title.x.bottom : NULL  
## .. ..$ axis.title.y :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : NULL  
## .. .. ..$ size : NULL  
## .. .. ..$ hjust : NULL  
## .. .. ..$ vjust : num 1  
## .. .. ..$ angle : num 90  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : 'margin' num [1:4] 0points 2.75points 0points 0points  
## .. .. .. ..- attr(\*, "unit")= int 8  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ axis.title.y.left : NULL  
## .. ..$ axis.title.y.right :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : NULL  
## .. .. ..$ size : NULL  
## .. .. ..$ hjust : NULL  
## .. .. ..$ vjust : num 0  
## .. .. ..$ angle : num -90  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : 'margin' num [1:4] 0points 0points 0points 2.75points  
## .. .. .. ..- attr(\*, "unit")= int 8  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ axis.text :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : chr "grey30"  
## .. .. ..$ size : 'rel' num 0.8  
## .. .. ..$ hjust : NULL  
## .. .. ..$ vjust : NULL  
## .. .. ..$ angle : NULL  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : NULL  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ axis.text.x :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : NULL  
## .. .. ..$ size : NULL  
## .. .. ..$ hjust : NULL  
## .. .. ..$ vjust : num 1  
## .. .. ..$ angle : NULL  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : 'margin' num [1:4] 2.2points 0points 0points 0points  
## .. .. .. ..- attr(\*, "unit")= int 8  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ axis.text.x.top :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : NULL  
## .. .. ..$ size : NULL  
## .. .. ..$ hjust : NULL  
## .. .. ..$ vjust : num 0  
## .. .. ..$ angle : NULL  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : 'margin' num [1:4] 0points 0points 2.2points 0points  
## .. .. .. ..- attr(\*, "unit")= int 8  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ axis.text.x.bottom : NULL  
## .. ..$ axis.text.y :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : NULL  
## .. .. ..$ size : NULL  
## .. .. ..$ hjust : num 1  
## .. .. ..$ vjust : NULL  
## .. .. ..$ angle : NULL  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : 'margin' num [1:4] 0points 2.2points 0points 0points  
## .. .. .. ..- attr(\*, "unit")= int 8  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ axis.text.y.left : NULL  
## .. ..$ axis.text.y.right :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : NULL  
## .. .. ..$ size : NULL  
## .. .. ..$ hjust : num 0  
## .. .. ..$ vjust : NULL  
## .. .. ..$ angle : NULL  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : 'margin' num [1:4] 0points 0points 0points 2.2points  
## .. .. .. ..- attr(\*, "unit")= int 8  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ axis.ticks : list()  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_blank" "element"  
## .. ..$ axis.ticks.x : NULL  
## .. ..$ axis.ticks.x.top : NULL  
## .. ..$ axis.ticks.x.bottom : NULL  
## .. ..$ axis.ticks.y : NULL  
## .. ..$ axis.ticks.y.left : NULL  
## .. ..$ axis.ticks.y.right : NULL  
## .. ..$ axis.ticks.length : 'simpleUnit' num 2.75points  
## .. .. ..- attr(\*, "unit")= int 8  
## .. ..$ axis.ticks.length.x : NULL  
## .. ..$ axis.ticks.length.x.top : NULL  
## .. ..$ axis.ticks.length.x.bottom: NULL  
## .. ..$ axis.ticks.length.y : NULL  
## .. ..$ axis.ticks.length.y.left : NULL  
## .. ..$ axis.ticks.length.y.right : NULL  
## .. ..$ axis.line : list()  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_blank" "element"  
## .. ..$ axis.line.x : NULL  
## .. ..$ axis.line.x.top : NULL  
## .. ..$ axis.line.x.bottom : NULL  
## .. ..$ axis.line.y : NULL  
## .. ..$ axis.line.y.left : NULL  
## .. ..$ axis.line.y.right : NULL  
## .. ..$ legend.background : list()  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_blank" "element"  
## .. ..$ legend.margin : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points  
## .. .. ..- attr(\*, "unit")= int 8  
## .. ..$ legend.spacing : 'simpleUnit' num 11points  
## .. .. ..- attr(\*, "unit")= int 8  
## .. ..$ legend.spacing.x : NULL  
## .. ..$ legend.spacing.y : NULL  
## .. ..$ legend.key : list()  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_blank" "element"  
## .. ..$ legend.key.size : 'simpleUnit' num 1.2lines  
## .. .. ..- attr(\*, "unit")= int 3  
## .. ..$ legend.key.height : NULL  
## .. ..$ legend.key.width : NULL  
## .. ..$ legend.text :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : NULL  
## .. .. ..$ size : 'rel' num 0.8  
## .. .. ..$ hjust : NULL  
## .. .. ..$ vjust : NULL  
## .. .. ..$ angle : NULL  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : NULL  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ legend.text.align : NULL  
## .. ..$ legend.title :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : NULL  
## .. .. ..$ size : NULL  
## .. .. ..$ hjust : num 0  
## .. .. ..$ vjust : NULL  
## .. .. ..$ angle : NULL  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : NULL  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ legend.title.align : NULL  
## .. ..$ legend.position : chr "right"  
## .. ..$ legend.direction : NULL  
## .. ..$ legend.justification : chr "center"  
## .. ..$ legend.box : NULL  
## .. ..$ legend.box.just : NULL  
## .. ..$ legend.box.margin : 'margin' num [1:4] 0cm 0cm 0cm 0cm  
## .. .. ..- attr(\*, "unit")= int 1  
## .. ..$ legend.box.background : list()  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_blank" "element"  
## .. ..$ legend.box.spacing : 'simpleUnit' num 11points  
## .. .. ..- attr(\*, "unit")= int 8  
## .. ..$ panel.background : list()  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_blank" "element"  
## .. ..$ panel.border : list()  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_blank" "element"  
## .. ..$ panel.spacing : 'simpleUnit' num 5.5points  
## .. .. ..- attr(\*, "unit")= int 8  
## .. ..$ panel.spacing.x : NULL  
## .. ..$ panel.spacing.y : NULL  
## .. ..$ panel.grid :List of 6  
## .. .. ..$ colour : chr "grey92"  
## .. .. ..$ linewidth : NULL  
## .. .. ..$ linetype : NULL  
## .. .. ..$ lineend : NULL  
## .. .. ..$ arrow : logi FALSE  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_line" "element"  
## .. ..$ panel.grid.major : NULL  
## .. ..$ panel.grid.minor :List of 6  
## .. .. ..$ colour : NULL  
## .. .. ..$ linewidth : 'rel' num 0.5  
## .. .. ..$ linetype : NULL  
## .. .. ..$ lineend : NULL  
## .. .. ..$ arrow : logi FALSE  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_line" "element"  
## .. ..$ panel.grid.major.x : NULL  
## .. ..$ panel.grid.major.y : NULL  
## .. ..$ panel.grid.minor.x : NULL  
## .. ..$ panel.grid.minor.y : NULL  
## .. ..$ panel.ontop : logi FALSE  
## .. ..$ plot.background : list()  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_blank" "element"  
## .. ..$ plot.title :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : NULL  
## .. .. ..$ size : 'rel' num 1.2  
## .. .. ..$ hjust : num 0  
## .. .. ..$ vjust : num 1  
## .. .. ..$ angle : NULL  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : 'margin' num [1:4] 0points 0points 5.5points 0points  
## .. .. .. ..- attr(\*, "unit")= int 8  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ plot.title.position : chr "panel"  
## .. ..$ plot.subtitle :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : NULL  
## .. .. ..$ size : NULL  
## .. .. ..$ hjust : num 0  
## .. .. ..$ vjust : num 1  
## .. .. ..$ angle : NULL  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : 'margin' num [1:4] 0points 0points 5.5points 0points  
## .. .. .. ..- attr(\*, "unit")= int 8  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ plot.caption :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : NULL  
## .. .. ..$ size : 'rel' num 0.8  
## .. .. ..$ hjust : num 1  
## .. .. ..$ vjust : num 1  
## .. .. ..$ angle : NULL  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : 'margin' num [1:4] 5.5points 0points 0points 0points  
## .. .. .. ..- attr(\*, "unit")= int 8  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ plot.caption.position : chr "panel"  
## .. ..$ plot.tag :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : NULL  
## .. .. ..$ size : 'rel' num 1.2  
## .. .. ..$ hjust : num 0.5  
## .. .. ..$ vjust : num 0.5  
## .. .. ..$ angle : NULL  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : NULL  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ plot.tag.position : chr "topleft"  
## .. ..$ plot.margin : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points  
## .. .. ..- attr(\*, "unit")= int 8  
## .. ..$ strip.background : list()  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_blank" "element"  
## .. ..$ strip.background.x : NULL  
## .. ..$ strip.background.y : NULL  
## .. ..$ strip.clip : chr "inherit"  
## .. ..$ strip.placement : chr "inside"  
## .. ..$ strip.text :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : chr "grey10"  
## .. .. ..$ size : 'rel' num 0.8  
## .. .. ..$ hjust : NULL  
## .. .. ..$ vjust : NULL  
## .. .. ..$ angle : NULL  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : 'margin' num [1:4] 4.4points 4.4points 4.4points 4.4points  
## .. .. .. ..- attr(\*, "unit")= int 8  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ strip.text.x : NULL  
## .. ..$ strip.text.x.bottom : NULL  
## .. ..$ strip.text.x.top : NULL  
## .. ..$ strip.text.y :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : NULL  
## .. .. ..$ size : NULL  
## .. .. ..$ hjust : NULL  
## .. .. ..$ vjust : NULL  
## .. .. ..$ angle : num -90  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : NULL  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ strip.text.y.left :List of 11  
## .. .. ..$ family : NULL  
## .. .. ..$ face : NULL  
## .. .. ..$ colour : NULL  
## .. .. ..$ size : NULL  
## .. .. ..$ hjust : NULL  
## .. .. ..$ vjust : NULL  
## .. .. ..$ angle : num 90  
## .. .. ..$ lineheight : NULL  
## .. .. ..$ margin : NULL  
## .. .. ..$ debug : NULL  
## .. .. ..$ inherit.blank: logi TRUE  
## .. .. ..- attr(\*, "class")= chr [1:2] "element\_text" "element"  
## .. ..$ strip.text.y.right : NULL  
## .. ..$ strip.switch.pad.grid : 'simpleUnit' num 2.75points  
## .. .. ..- attr(\*, "unit")= int 8  
## .. ..$ strip.switch.pad.wrap : 'simpleUnit' num 2.75points  
## .. .. ..- attr(\*, "unit")= int 8  
## .. ..- attr(\*, "class")= chr [1:2] "theme" "gg"  
## .. ..- attr(\*, "complete")= logi TRUE  
## .. ..- attr(\*, "validate")= logi TRUE  
## ..$ coordinates:Classes 'CoordFlip', 'CoordCartesian', 'Coord', 'ggproto', 'gg' <ggproto object: Class CoordFlip, CoordCartesian, Coord, gg>  
## aspect: function  
## backtransform\_range: function  
## clip: on  
## default: FALSE  
## distance: function  
## expand: TRUE  
## is\_free: function  
## is\_linear: function  
## labels: function  
## limits: list  
## modify\_scales: function  
## range: function  
## render\_axis\_h: function  
## render\_axis\_v: function  
## render\_bg: function  
## render\_fg: function  
## setup\_data: function  
## setup\_layout: function  
## setup\_panel\_guides: function  
## setup\_panel\_params: function  
## setup\_params: function  
## train\_panel\_guides: function  
## transform: function  
## super: <ggproto object: Class CoordFlip, CoordCartesian, Coord, gg>   
## ..$ facet :Classes 'FacetNull', 'Facet', 'ggproto', 'gg' <ggproto object: Class FacetNull, Facet, gg>  
## compute\_layout: function  
## draw\_back: function  
## draw\_front: function  
## draw\_labels: function  
## draw\_panels: function  
## finish\_data: function  
## init\_scales: function  
## map\_data: function  
## params: list  
## setup\_data: function  
## setup\_params: function  
## shrink: TRUE  
## train\_scales: function  
## vars: function  
## super: <ggproto object: Class FacetNull, Facet, gg>   
## ..$ plot\_env :<environment: 0x7f941925aa48>   
## ..$ labels :List of 2  
## .. ..$ y: chr "# Missing"  
## .. ..$ x: chr "Variables"  
## ..- attr(\*, "class")= chr [1:2] "gg" "ggplot"  
## $ plot.caption: chr "Plot 1. Missing weights of perch trout"  
## - attr(\*, "class")= chr [1:2] "theme" "gg"  
## - attr(\*, "complete")= logi FALSE  
## - attr(\*, "validate")= logi TRUE

trout\_model <- lm(weight ~ length, data = trout)

par(mfrow = c(2, 2))  
plot(trout\_model)



dev.off()

## null device   
## 1

model\_summary <- summary(trout\_model)  
  
model\_summary

##   
## Call:  
## lm(formula = weight ~ length, data = trout)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -3.0828 -0.4862 -0.1830 0.4128 7.3191   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -11.702476 0.481564 -24.30 <2e-16 \*\*\*  
## length 0.199852 0.005584 35.79 <2e-16 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 1.057 on 288 degrees of freedom  
## (199 observations deleted due to missingness)  
## Multiple R-squared: 0.8164, Adjusted R-squared: 0.8158   
## F-statistic: 1281 on 1 and 288 DF, p-value: < 2.2e-16

model\_squares <- anova(trout\_model)  
  
model\_squares

## Analysis of Variance Table  
##   
## Response: weight  
## Df Sum Sq Mean Sq F value Pr(>F)   
## length 1 1432.29 1432.29 1280.8 < 2.2e-16 \*\*\*  
## Residuals 288 322.05 1.12   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1