Tutorial 2

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```
#### Preamble ####
# Purpose: Read in data from the 2021 Canadian Federal Election and make
# a graph of the number of seats each party won.
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# Date: 8 January 2024
# Prerequisites: Know where to get Canadian elections data.
```

```
#### Workspace setup ####
library(tidyverse)
```

```
── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0 ──
✓ dplyr     1.1.4     ✓ readr     2.1.4
✓ forcats   1.0.0     ✓ stringr   1.5.1
✓ ggplot2   3.4.4     ✓ tibble    3.2.1
✓ lubridate 1.9.3     ✓ tidyr     1.3.0
✓ purrr     1.0.2
── 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(janitor)
```

```
Attaching package: 'janitor'

The following objects are masked from 'package:stats':

    chisq.test, fisher.test
```

```
simulated_data <-
  tibble(
    # Use 1 through to 338 to represent each division
    "Elected Candidate" = 1:338,
    # Randomly pick an option, with replacement, 338 times
    "Party" = sample(
      x = c("Liberal", "Conservative", "Bloc Québécois", "NDP", "Green"),
      size = 338,
      replace = TRUE
    )
  )
```

```
simulated_data
```

```
# A tibble: 338 × 2
   `Elected Candidate` Party
                 <int> <chr>
 1                   1 Conservative
 2                   2 Liberal
 3                   3 NDP
 4                   4 Bloc Québécois
 5                   5 Green
 6                   6 Bloc Québécois
 7                   7 Liberal
 8                   8 Green
 9                   9 Bloc Québécois
10                  10 Bloc Québécois
# ℹ 328 more rows
```

```
#### Read in the data ####
raw_elections_data <-
  read_csv(
    file =
      "https://www.elections.ca/res/rep/off/ovr2021app/53/data_donnees/table_tableau11.csv",
    show_col_types = FALSE,
    skip = 0
  )

# We have read the data from the Elections Canada website. We may like to save
# it in case something happens or they move it.
write_csv(
  x = raw_elections_data,
  file = "canadian_voting.csv"
)
```

```
head(raw_elections_data)
```

```
# A tibble: 6 × 13
  Province              Electoral District N…¹ Electoral District N…² Population
  <chr>                 <chr>                                  <dbl>      <dbl>
1 Newfoundland and Lab… Avalon                                 10001      86494
2 Newfoundland and Lab… Bonavista--Burin--Tri…                 10002      74116
3 Newfoundland and Lab… Coast of Bays--Centra…                 10003      77680
4 Newfoundland and Lab… Labrador                               10004      27197
5 Newfoundland and Lab… Long Range Mountains                   10005      86553
6 Newfoundland and Lab… St. John's East/St. J…                 10006      85697
# ℹ abbreviated names: ¹`Electoral District Name/Nom de circonscription`,
#   ²`Electoral District Number/Numéro de circonscription`
# ℹ 9 more variables: `Electors/Électeurs` <dbl>,
#   `Polling Stations/Bureaux de scrutin` <dbl>,
```

```
#   `Valid Ballots/Bulletins valides` <dbl>,
#   `Percentage of Valid Ballots /Pourcentage des bulletins valides` <dbl>,
#   `Rejected Ballots/Bulletins rejetés` <dbl>, …
```

```
tail(raw_elections_data)
```

```
# A tibble: 6 × 13
  Province              Electoral District N…¹ Electoral District N…² Population
  <chr>                 <chr>                                  <dbl>      <dbl>
1 British Columbia/Col… Vancouver South/Vanco…                 59040     102927
2 British Columbia/Col… Victoria                               59041     117133
3 British Columbia/Col… West Vancouver--Sunsh…                 59042     119113
4 Yukon                 Yukon                                  60001      35874
5 Northwest Territorie… Northwest Territories…                 61001      41786
6 Nunavut               Nunavut                                62001      35944
# ℹ abbreviated names: ¹`Electoral District Name/Nom de circonscription`,
#   ²`Electoral District Number/Numéro de circonscription`
# ℹ 9 more variables: `Electors/Électeurs` <dbl>,
#   `Polling Stations/Bureaux de scrutin` <dbl>,
#   `Valid Ballots/Bulletins valides` <dbl>,
#   `Percentage of Valid Ballots /Pourcentage des bulletins valides` <dbl>,
#   `Rejected Ballots/Bulletins rejetés` <dbl>, …
```

```
#### Basic cleaning ####
raw_elections_data <-
  read_csv(
    file = "canadian_voting.csv",
    show_col_types = FALSE
  )
```

```
# Make the names easier to type
cleaned_elections_data <-
  clean_names(raw_elections_data)

# Have a look at the first six rows
head(cleaned_elections_data)
```

```
# A tibble: 6 × 13
  province              electoral_district_n…¹ electoral_district_n…² population
  <chr>                 <chr>                                  <dbl>      <dbl>
1 Newfoundland and Lab… Avalon                                 10001      86494
2 Newfoundland and Lab… Bonavista--Burin--Tri…                 10002      74116
3 Newfoundland and Lab… Coast of Bays--Centra…                 10003      77680
4 Newfoundland and Lab… Labrador                               10004      27197
5 Newfoundland and Lab… Long Range Mountains                   10005      86553
6 Newfoundland and Lab… St. John's East/St. J…                 10006      85697
# ℹ abbreviated names: ¹electoral_district_name_nom_de_circonscription,
#   ²electoral_district_number_numero_de_circonscription
# ℹ 9 more variables: electors_electeurs <dbl>,
```

```
#   polling_stations_bureaux_de_scrutin <dbl>,
#   valid_ballots_bulletins_valides <dbl>,
#   percentage_of_valid_ballots_pourcentage_des_bulletins_valides <dbl>,
#   rejected_ballots_bulletins_rejetes <dbl>, …
```

```
cleaned_elections_data <-
  cleaned_elections_data |>
  select(
    electoral_district_name_nom_de_circonscription,
    elected_candidate_candidat_elu
  )

head(cleaned_elections_data)
```

```
# A tibble: 6 × 2
  electoral_district_name_nom_de_circonscription elected_candidate_candidat_elu
  <chr>                                          <chr>
1 Avalon                                         McDonald, Ken Liberal/Libéral
2 Bonavista--Burin--Trinity                      Rogers, Churence Liberal/Libér…
3 Coast of Bays--Central--Notre Dame             Small, Clifford Conservative/C…
4 Labrador                                       Jones, Yvonne Liberal/Libéral
5 Long Range Mountains                           Hutchings, Gudie Liberal/Libér…
6 St. John's East/St. John's-Est                 Thompson, Joanne Liberal/Libér…
```

```
names(cleaned_elections_data)
```

```
[1] "electoral_district_name_nom_de_circonscription"
[2] "elected_candidate_candidat_elu"
```

```
cleaned_elections_data <-
  cleaned_elections_data |>
  rename(
    electoral_district = electoral_district_name_nom_de_circonscription,
    elected_candidate = elected_candidate_candidat_elu
  )

head(cleaned_elections_data)
```

```
# A tibble: 6 × 2
  electoral_district               elected_candidate
  <chr>                            <chr>
1 Avalon                           McDonald, Ken Liberal/Libéral
2 Bonavista--Burin--Trinity        Rogers, Churence Liberal/Libéral
3 Coast of Bays--Central--Notre Dame Small, Clifford Conservative/Conservateur
4 Labrador                         Jones, Yvonne Liberal/Libéral
5 Long Range Mountains             Hutchings, Gudie Liberal/Libéral
6 St. John's East/St. John's-Est   Thompson, Joanne Liberal/Libéral
```

```
cleaned_elections_data <-
  cleaned_elections_data |>
  separate(
    col = elected_candidate,
    into = c("Other", "party"),
    sep = "/"
  ) |>
  select(-Other)
```

```
cleaned_elections_data$party |>
  unique()
```

```
[1] "Libéral"                       "Conservateur"
[3] "Bloc Québécois"                "NPD-Nouveau Parti démocratique"
[5] "Parti Vert"
```

```
cleaned_elections_data <-
  cleaned_elections_data |>
  mutate(
    party =
      case_match(
        party,
        "Libéral" ~ "Liberal",
        "Bloc Québécois" ~ "Bloc Québécois",
        "Parti Vert" ~ "Green",
        "Conservateur" ~ "Conservative",
        "NPD-Nouveau Parti démocratique" ~ "NDP"
      )
  )

head(cleaned_elections_data)
```

```
# A tibble: 6 × 2
  electoral_district                party
  <chr>                             <chr>
1 Avalon                            Liberal
2 Bonavista--Burin--Trinity         Liberal
3 Coast of Bays--Central--Notre Dame Conservative
4 Labrador                          Liberal
5 Long Range Mountains              Liberal
6 St. John's East/St. John's-Est    Liberal
```

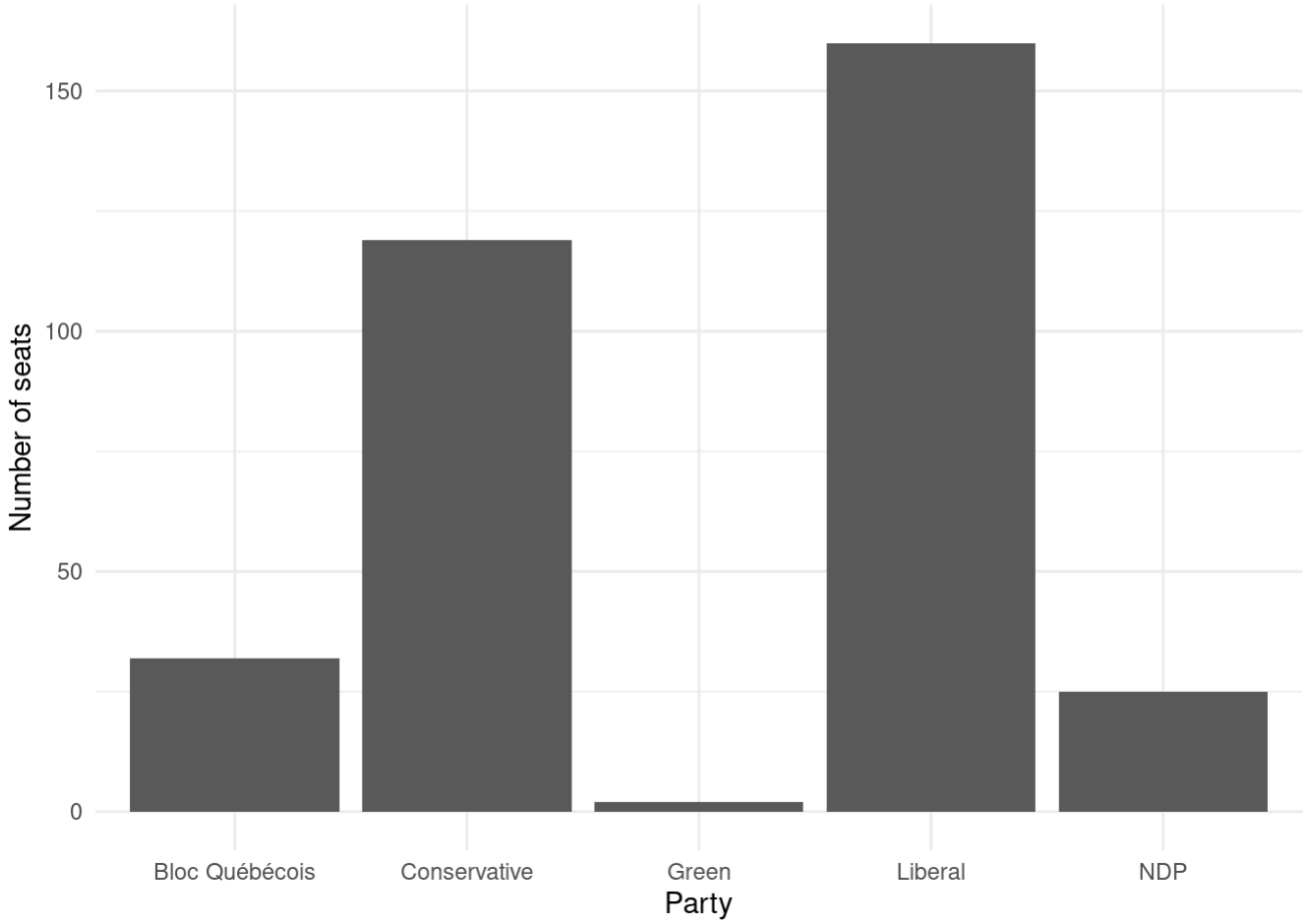
```
write_csv(
  x = cleaned_elections_data,
  file = "cleaned_canadian_elections_data.csv"
)
```

```r
#### Read in the data ####
cleaned_elections_data <-
  read_csv(
    file = "cleaned_canadian_elections_data.csv",
    show_col_types = FALSE
  )
```

```r
cleaned_elections_data |>
  count(party)
```

```
# A tibble: 5 × 2
  party              n
  <chr>          <int>
1 Bloc Québécois    32
2 Conservative     119
3 Green              2
4 Liberal          160
5 NDP               25
```

```r
cleaned_elections_data |>
  ggplot(aes(x = party)) +
  geom_bar() +
  theme_minimal() + # Make the theme neater
  labs(x = "Party", y = "Number of seats") # Make labels more meaningful
```


150
100
50
0
Number of seats
Bloc Québécois
Conservative
Green
Liberal
NDP
Party