

Question 3

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Plot 1

- Loading data and creating a column for date

```
data("greenhouse_gases")
greenhouse_gases <- greenhouse_gases %>%
  mutate(date = as.Date(paste(year, "01", "01", sep = "-")))

greenhouse_gases |> glimpse()
```

Rows: 300

Columns: 4

```
$ year      <dbl> 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, ~
$ gas       <chr> "CO2", "CO2", "CO2", "CO2", "CO2", "CO2", "CO2", "CO2", ~
$ concentration <dbl> 277.7, 277.8, 277.3, 277.3, 277.5, 277.6, 278.3, 279.7, ~
$ date      <date> 20-01-01, 40-01-01, 60-01-01, 80-01-01, 100-01-01, 120-~
```

- Color assignment for each gas

```
colors <- c("N2O" = "purple", "CO2" = "cyan", "CH4" = "yellow")
```

- Defining breaks and labels for the x-axis

```
x_breaks <- as.Date(c("0020-01-01", "0515-01-01", "1010-01-01", "1505-01-01", "2000-01-01"))
x_labels <- c("20-01-01", "515-01-01", "1010-01-01", "1505-01-01", "2000-01-01")
```

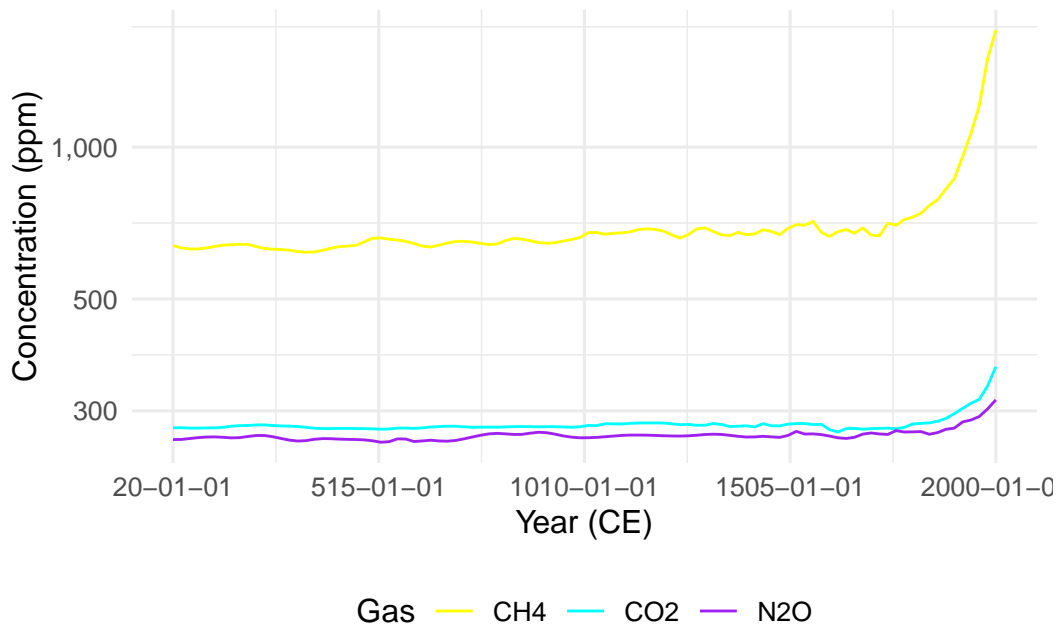
- Making plot 1

```

plot_1 <- greenhouse_gases %>%
  ggplot(aes(x = date, y = concentration, color = gas)) +
  geom_line() +
  scale_y_log10(labels = comma) +
  scale_x_date(breaks = x_breaks, labels = x_labels) +
  scale_color_manual(values = colors, name = "Gas") +
  labs(x = "Year (CE)", y = "Concentration (ppm)") +
  theme_minimal(base_size = 12) +
  theme(
    legend.position = "bottom",
    legend.title = element_text(hjust = 0.5))
  panel.background = element_rect(fill = "white", color = NA)
  panel.grid.major = element_line(color = "grey90", linewidth = 0.5)
  panel.grid.minor = element_blank()
  axis.text = element_text(color = "black")
  axis.title = element_text(color = "black")
  legend.background = element_rect(fill = "white", color = NA)
  legend.key = element_rect(fill = "white", color = NA)
  legend.box.background = element_rect(color = "white") +
  guides(color = guide_legend(title = "Gas", title.position = "left", title.hjust = 0.5))

plot_1

```



Plot 2

- Loading the data and filtering year

```
plot_2_data <- greenhouse_gases %>%  
  filter(year >= 1800 & year <= 2000)  
  
plot_2_data |> glimpse()
```

Rows: 33

Columns: 4

```
$ year      <dbl> 1800, 1820, 1840, 1860, 1880, 1900, 1920, 1940, 1960, 1980, 2000  
$ gas       <chr> "CO2", "CO2", "CO2", "CO2", "CO2", "CO2", "CO2", "CO2", "CO2", "CO2", "CO2"  
$ concentration <dbl> 282.6, 283.3, 284.0, 286.1, 289.8, 296.1, 303.4, 310.5, 318.2, 325.6, 332.5  
$ date      <date> 1800-01-01, 1820-01-01, 1840-01-01, 1860-01-01, 1880-01-01, 1900-01-01, 1920-01-01, 1940-01-01, 1960-01-01, 1980-01-01, 2000-01-01
```

- Making plot 2

```
plot_2 <- plot_2_data %>%  
  ggplot(aes(x = year, y = fct_rev(gas), fill = concentration)) +  
  geom_tile(color = "white") +  
  scale_fill_viridis_c(option = "mako", direction = -1, trans = "log10") +  
  scale_x_continuous(breaks = c(1800, 1820, 1840, 1860, 1880, 1900, 1920, 1940, 1960, 1980, 2000)) +  
  labs(x = "Year", y = "Gas", fill = "Concentration (ppm)") +  
  theme_minimal() +  
  theme(axis.title = element_text(size = 12),  
        axis.text = element_text(size = 10),  
        legend.title = element_text(size = 10),  
        legend.text = element_text(size = 8),  
        legend.position = "right") +  
  guides(fill = guide_colorbar(title = str_wrap("Concentration\n(ppm)", width = 10)))  
  
plot_2
```

