MTH1004 Solutions to Formative exercise for poster coursework

1. Download and read

Create a new directory where you save the downloaded `ukgas.csv` file. In the Rstudio files pane (bottom right), navigate to that directory and choose "Set as working directory". Then R knows that it should read data from that directory, and any plots that you save with `ggsave(...)` will be saved in that directory.

```
library(tidyverse)
```

```
gas = read_csv('ukgas.csv')
```

2. Highest median gas consumption

```
gas %>% summarise(m1 = median(Qtr1),
                  m2 = median(Qtr2),
                  m3 = median(Qtr3),
                  m4 = median(Qtr4))
```

```
## # A tibble: 1 × 4
##      m1    m2    m3    m4
##   <dbl> <dbl> <dbl> <dbl>
## 1  371.  240.  176.  355.
```

Quarter 1 has the highest median gas consumption, follows by Q4, Q2 and Q3.

3. Gas concumption differences 1970 vs 1975

```
gas %>%
  filter(Year == 1970 | Year == 1975)
```

```
## # A tibble: 2 × 5
##    Year  Qtr1  Qtr2  Qtr3  Qtr4
##   <dbl> <dbl> <dbl> <dbl> <dbl>
## 1  1970  245.  216.  189.  142.
## 2  1975  492.  322.  178.  410.
```

Gas consumption increased from 1970 to 1975 by 268 mio. therms in Q4, by 247 mio. therms Q1, and by 106 mio. therms in Q2. Q3 saw a slight decrease by 11 mio therms.

4. Time series plot

```
plt = ggplot(gas) +
  geom_line(aes(x=Year, y=Qtr1, colour='Quarter 1')) +
  geom_line(aes(x=Year, y=Qtr2, colour='Quarter 2')) +
  geom_line(aes(x=Year, y=Qtr3, colour='Quarter 3')) +
```

```
  geom_line(aes(x=Year, y=Qtr4, colour='Quarter 4')) +
  labs(x=NULL, y='UK gas consumption [mio. therms]', colour=NULL)
ggsave('ukgas.png', plt, width=7, height=4, dpi=720)
```

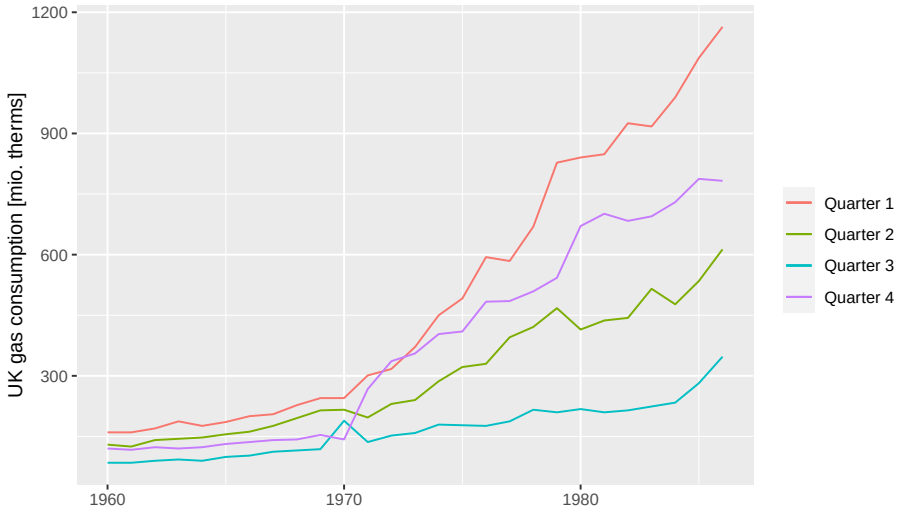

Figure 1: UK gas consumption per quarter from 1960 to 1986

Figure 1 shows quarterly UK gas consumption from 1960 to 1986. The general trend is upward from about 150 mio. therms per quarter in 1960 to over 300 mio therms in Quarter 3 (summer) to almost 1200 mio. therms in Quarter 1 (winter). Comparing 1970 with 1975 specifically, increases were seen in Q1 (+247m therms), in Q2 (+106m therms), and in Q4 (+267m therms). Due to an anomalously large consumption in Q3 of 1970, Q3 saw a decrease from 1970 to 1975 by 11.2m therms. While total gas consumption per quarter increased, the rate of increase in Q4 seems higher than the increases in other quarters, which could be explained by several factors, such as seasonal changes in industrial processes that rely on gas, or rising wealth in the population who could afford to start heating their homes earlier in the year.