SAD- projekt 1

Autorzy

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Wykożystane pakiety i ustawiena

```
require(tidyverse)
theme_set(theme_bw())
```
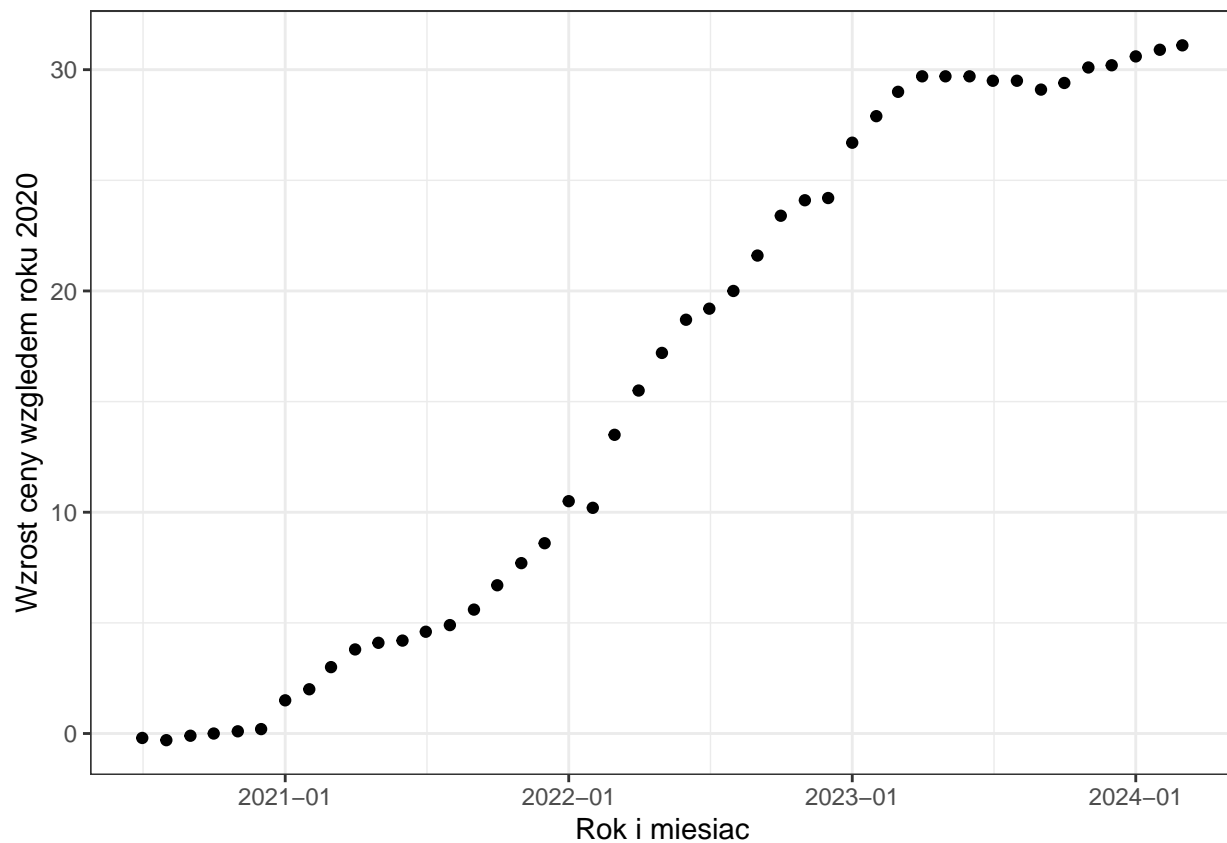
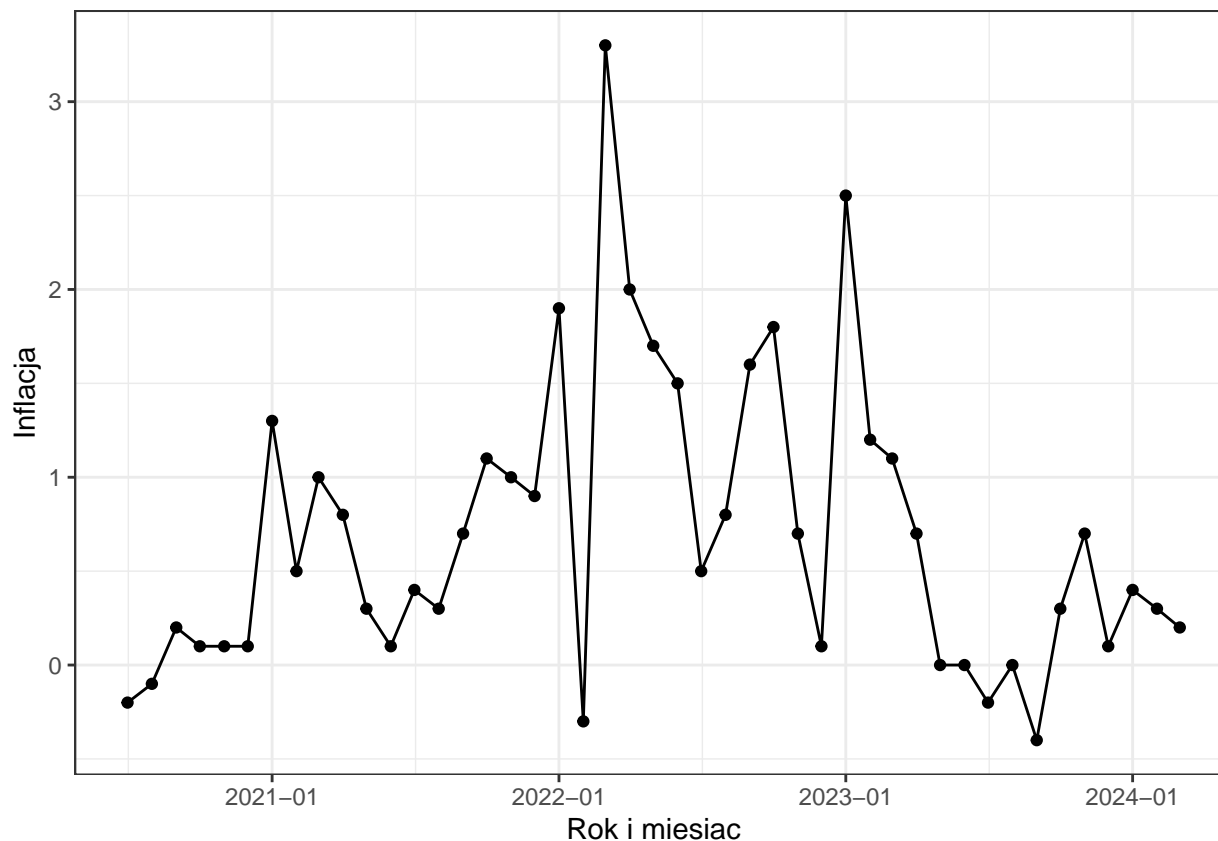**Zadanie 1**

Inflacja od 2020-07 do 2024-03

```
infl_mies <- read_csv2("inflacja_mies.csv", locale=locale(encoding="latin1"),
 show_col_types = FALSE)
```

```
## i Using "','" as decimal and "'.'" as grouping mark. Use `read_delim()` for more control.
```

```
infl_mies <- infl_mies %>% filter(reprezentacja == "Poprzedni miesiac = 100")
infl_mies <- infl_mies %>% select(Rok, Miesiac,Wartosc)
infl_mies <- infl_mies %>%
  mutate(date = as.Date(sprintf("%04d-%02d-01", Rok, Miesiac)))
infl_mies <- infl_mies %>% filter(date < as.Date("2024-04-01"),
 date >= as.Date("2020-07-01"))
infl_mies <- infl_mies %>% arrange(date)
abs_value <- numeric(length(infl_mies$Wartosc))
inflation_col <- numeric(length(infl_mies$Wartosc))
abs_value[1] =  infl_mies$Wartosc[1] - 100.0
inflation_col[1] = infl_mies$Wartosc[1] - 100.0
for (i in 2:length(infl_mies$Wartosc)){
    abs_value[i] <-  infl_mies$Wartosc[i] - 100 + abs_value[i-1]
    inflation_col[i] <- infl_mies$Wartosc[i] - 100.0
}
infl_mies$norm = abs_value
infl_mies$inflation = inflation_col
ggplot(data = infl_mies, aes(x=date, y =norm)) + geom_point() +
scale_x_date(date_labels = "%Y-%m") +
 labs(x = "Rok i miesiąc", y = "Wzrost ceny względem roku 2020")
```

```
ggplot(data = infl_mies, aes(x=date, y = inflation)) + geom_line() + geom_point() +
scale_x_date(date_labels = "%Y-%m") +
labs(x = "Rok i miesiąc", y = "Inflacja")
```

```r
products <- read_csv2("produkty.csv", locale=locale(encoding="latin1"),
  show_col_types = FALSE)
```

```
## i Using "','" as decimal and "'.'" as grouping mark. Use `read_delim()` for more control.
```

```r
products <- products %>% select(id_pozycja_3, wartosc, opis_okres, id_pozycja_2)
products <- products %>% mutate(year_month = as.Date(paste(substr(opis_okres, 1, 4),
  substr(opis_okres, 7, 8), "01",sep = "-")))
energy <- products %>% filter(id_pozycja_3 == 5946305)
energy <- energy %>% arrange(year_month)
water <- products %>% filter(id_pozycja_3 == 5946307)
water <- water %>% arrange(year_month)
heat <- products %>% filter(id_pozycja_3 == 5946309)
heat <- heat %>% arrange(year_month)
gaz <- products %>% filter(id_pozycja_3 == 7174400)
gaz <- gaz %>% arrange(year_month)
bread <- products %>% filter(id_pozycja_2 == 5967449)
bread <- bread %>% arrange(year_month)
chicken <- products %>% filter(id_pozycja_2 == 5967456)
chicken <- chicken %>% arrange(year_month)
butter <- products %>% filter(id_pozycja_2 == 5967467)
butter <- butter %>% arrange(year_month)
```

```
eggs <- products %>% filter(id_pozycja_2 == 5967465)
eggs <- eggs %>% arrange(year_month)
cheese <- products %>% filter(id_pozycja_2 == 5967464)
cheese <- cheese %>% arrange(year_month)
```

Oficjalna inflacja razem ze zmianami produktów

```
calc_infl <- function(x) {
  infl <- numeric(length(x))
  infl[1] = 0
  for(i in 2:length(x)){
    infl[i] = x[i] * 100.0/x[i-1] - 100
  }
  infl
}

normalise <- function(x) {
  normalised <- numeric(length(x))
  normalised[1] = 0
  for(i in 2:length(x)){
    normalised[i] = x[i] * 100.0/x[i-1] - 100 + normalised[i-1]
  }
  normalised
}
```

```
gaz$norm = normalise(gaz$wartosc)
gaz$inflation =  calc_infl(gaz$wartosc)
heat$norm = normalise(heat$wartosc)
heat$inflation = calc_infl(heat$wartosc)
water$norm = normalise(water$wartosc)
water$inflation = calc_infl(water$wartosc)
energy$norm = normalise(energy$wartosc)
energy$inflation = calc_infl(energy$wartosc)
bread$inflation = calc_infl(bread$wartosc)
bread$norm = normalise(bread$wartosc)
eggs$inflation = calc_infl(eggs$wartosc)
eggs$norm = normalise(eggs$wartosc)
chicken$inflation = calc_infl(chicken$wartosc)
chicken$norm = normalise(chicken$wartosc)
butter$inflation = calc_infl(butter$wartosc)
butter$norm = normalise(butter$wartosc)
cheese$inflation = calc_infl(cheese$wartosc)
cheese$norm = calc_infl(cheese$wartosc)
offset = infl_mies$norm[1]
infl_mies <- infl_mies %>% mutate(norm = infl_mies$norm - offset)
```

```r
plot_data <- tibble(date = infl_mies$date, gaz_norm = gaz$inflation,
  heat_norm = heat$inflation, water_norm = water$inflation,
  energy_norm = energy$inflation, infl_norm = infl_mies$inflation )

plot <- ggplot(plot_data, aes(date)) +
  geom_line(aes(y = gaz_norm, color = "Gaz ziemny"),
    size = 1) +
  geom_point(aes(y = gaz_norm, color = "Gaz ziemny")) +
  geom_line(aes(y = heat_norm, color = "Centralne ogrzewanie"), size = 1) +
  geom_point(aes(y = heat_norm, color = "Centralne ogrzewanie")) +
  geom_line(aes(y = water_norm, color = "Ciepła woda"), size = 1) +
  geom_point(aes(y = water_norm, color = "Ciepła woda")) +
  geom_line(aes(y = energy_norm, color = "Energia elektryczna"), size = 1) +
  geom_point(aes(y = energy_norm, color = "Energia elektryczna")) +
  geom_line(aes(y = infl_norm, color = "Inflacja"), size = 1) +
  geom_point(aes(y = infl_norm, color = "Inflacja")) +
  labs(x = "Rok i miesiąc", y = "%", color = "Towary") +
  ggtitle("Inflacja towarów") +
  scale_x_date(date_labels = "%Y-%m")

plot
```

```
## Warning: Removed 3 rows containing missing values or values outside the scale
## range (`geom_line()`).
```
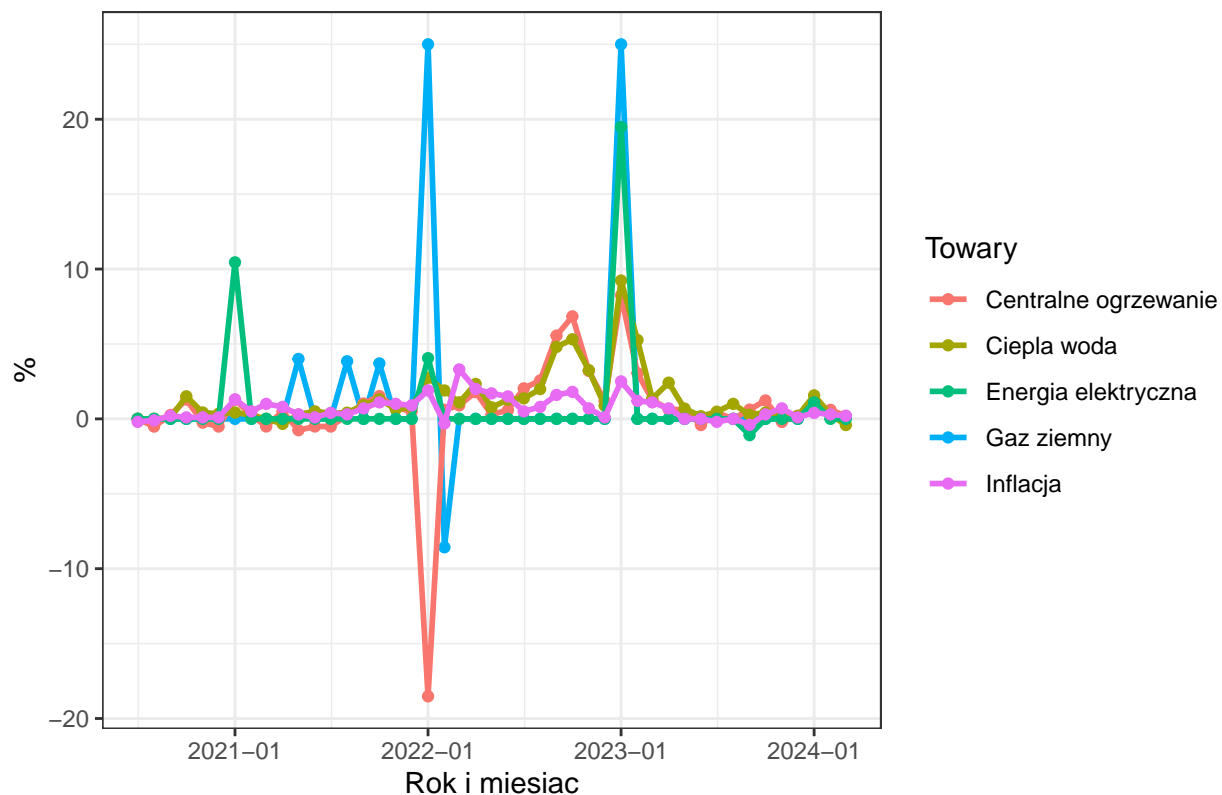
```
## Warning: Removed 3 rows containing missing values or values outside the scale
## range (`geom_point()`).
```

Inflacja towarów


```r
ggsave("inflacja_towary_niejedzeniowe.png")
```

```
## Saving 6.5 x 4.5 in image
```

```
## Warning: Removed 3 rows containing missing values or values outside the scale range ('geom_
## Removed 3 rows containing missing values or values outside the scale range ('geom_point()')
```

Względna różnica towary nie jedzeniowe

```r
plot_data <- tibble(date = infl_mies$date - infl_mies$inflation, gaz_norm = gaz$inflation - in
  heat_norm = heat$inflation - infl_mies$inflation, water_norm = water$inflation - infl_mies$i
  energy_norm = energy$inflation - infl_mies$inflation)

plot <- ggplot(plot_data, aes(date)) +
  geom_line(aes(y = gaz_norm, color = "Gaz ziemny"),
   size = 1) +
  geom_point(aes(y = gaz_norm, color = "Gaz ziemny")) +
  geom_line(aes(y = heat_norm, color = "Centralne ogrzewanie"), size = 1) +
  geom_point(aes(y = heat_norm, color = "Centralne ogrzewanie")) +
  geom_line(aes(y = water_norm, color = "Ciepła woda"), size = 1) +
  geom_point(aes(y = water_norm, color = "Ciepła woda")) +
```

```
geom_line(aes(y = energy_norm, color = "Energia elektryczna"), size = 1) +
geom_point(aes(y = energy_norm, color = "Energia elektryczna"))  +
labs(x = "Rok i miesiąc", y = "%", color = "Towary") +
ggtitle("Względna różnica pomiędzy inflacją a inflacją rzeczywistą produktów") +

scale_x_date(date_labels = "%Y-%m")

plot
```

```
## Warning: Removed 3 rows containing missing values or values outside the scale
## range ('geom_line()').
```

```
## Warning: Removed 3 rows containing missing values or values outside the scale
## range ('geom_point()').
```


Wzgledna róznica pomiedzy inflacja a inflacja rzeczywista produktów
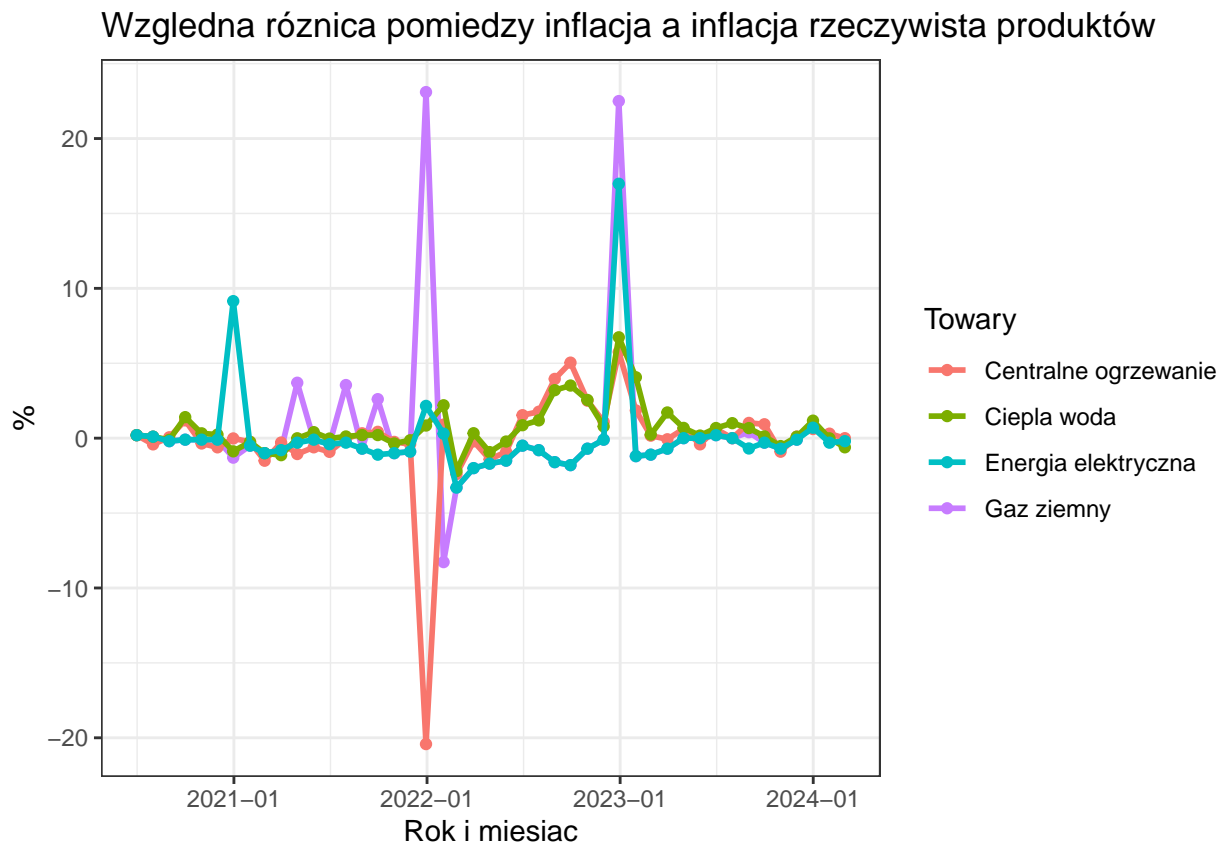
```
ggsave("r_wzgl_towary_nie_jedz.png")
```

```
## Saving 6.5 x 4.5 in image
```

```
## Warning: Removed 3 rows containing missing values or values outside the scale range ('geom_
## Removed 3 rows containing missing values or values outside the scale range ('geom_point()')
```

Wykres inflacjii dla produktów spożywczych

```r
plot_data <- tibble(date = infl_mies$date, chicken_i = chicken$inflation,
  butter_i = butter$inflation, cheese_i = cheese$inflation,
  eggs_i = eggs$inflation, bread_i = bread$inflation, infl_i = infl_mies$inflation)

plot <- ggplot(plot_data, aes(date)) +
  geom_line(aes(y = cheese_i, color = "Ser "),
   size = 1) +
  geom_line(aes(y = bread_i, color = "Chleb"), size = 1) +
  geom_point(aes(y = bread_i, color = "Chleb")) +
  geom_line(aes(y = butter_i, color = "Masło"), size = 1) +
  geom_point(aes(y = butter_i, color = "Masło")) +
  geom_point(aes(y = cheese_i, color = "Ser ")) +
  geom_line(aes(y = infl_i, color = "Inflacja"), size = 1) +
  geom_point(aes(y = infl_i, color = "Inflacja")) +
  labs(x = "Rok i miesiąc", y = "%", color = "Towary") +
  ggtitle("Inflacja towarów")

plot
```
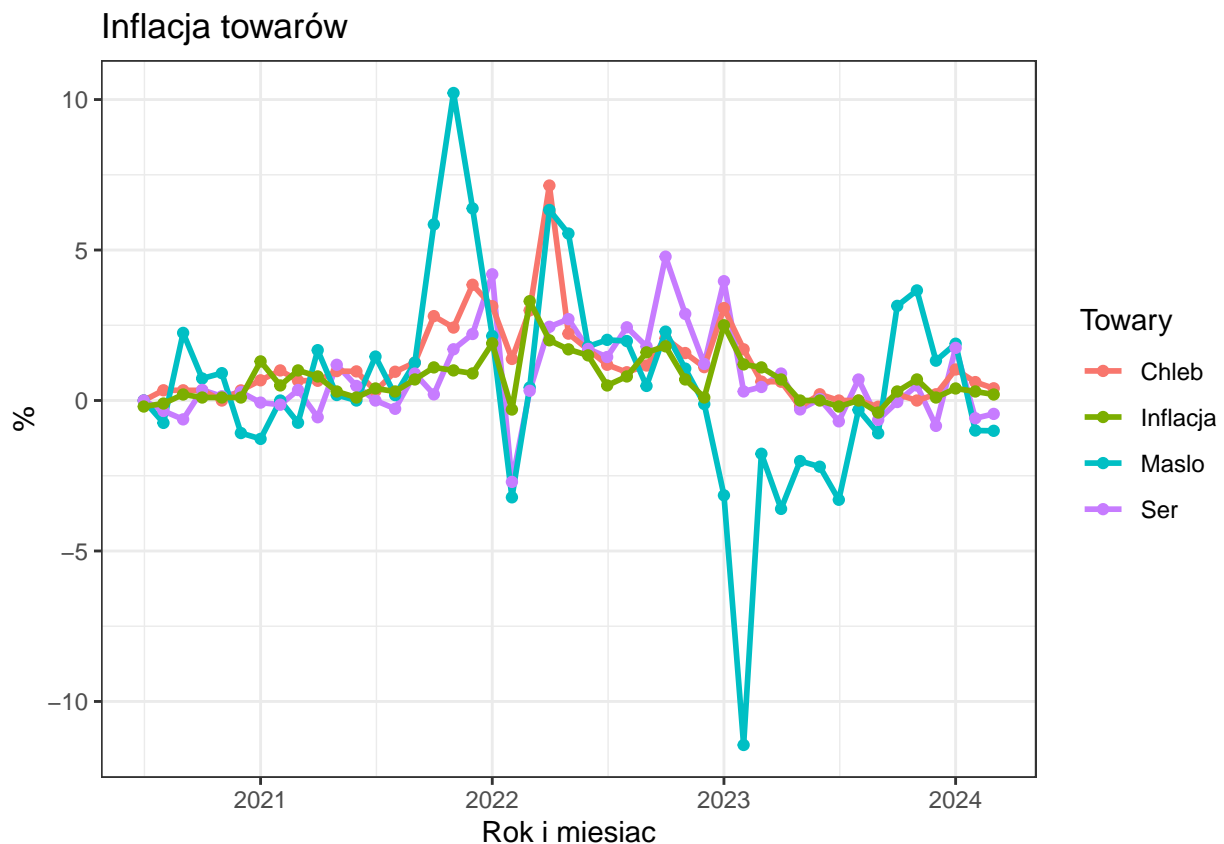
```
ggsave("infl_towary_jedze1.png")
```
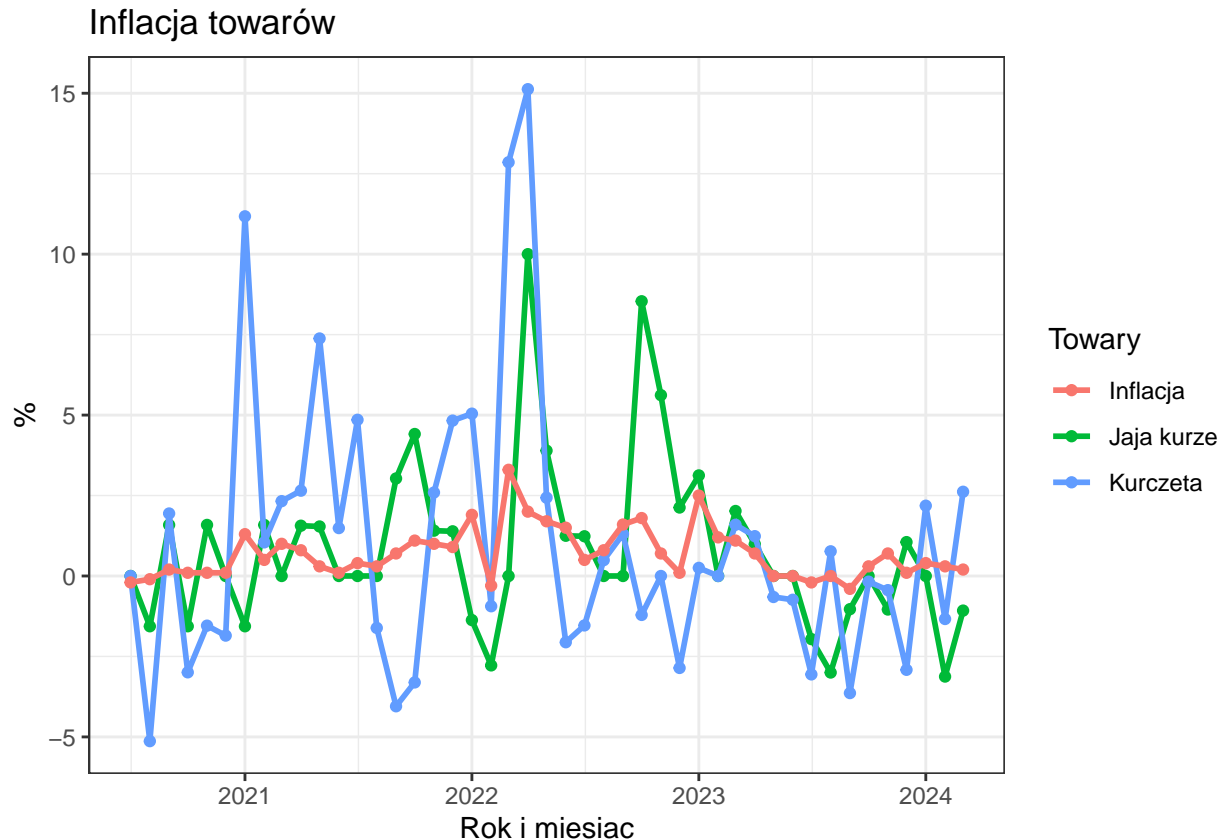
```
## Saving 6.5 x 4.5 in image
```

Wykres inflacjii dla produktów spożywczych 2

```
plot_data <- tibble(date = infl_mies$date, chicken_i = chicken$inflation,
  butter_i = butter$inflation, cheese_i = cheese$inflation,
  eggs_i = eggs$inflation, bread_i = bread$inflation, infl_i = infl_mies$inflation)

plot <- ggplot(plot_data, aes(date)) +
  geom_line(aes(y = eggs_i, color = "Jaja kurze"), size = 1) +
  geom_point(aes(y = eggs_i, color = "Jaja kurze")) +
  geom_line(aes(y = chicken_i, color = "Kurczęta"), size = 1) +
  geom_point(aes(y = chicken_i, color = "Kurczęta")) +
  geom_line(aes(y = infl_i, color = "Inflacja"), size = 1) +
  geom_point(aes(y = infl_i, color = "Inflacja")) +
  labs(x = "Rok i miesiąc", y = "%", color = "Towary") +
  ggtitle("Inflacja towarów")

plot
```

```
ggsave("infl_towary_jedze2.png")
```
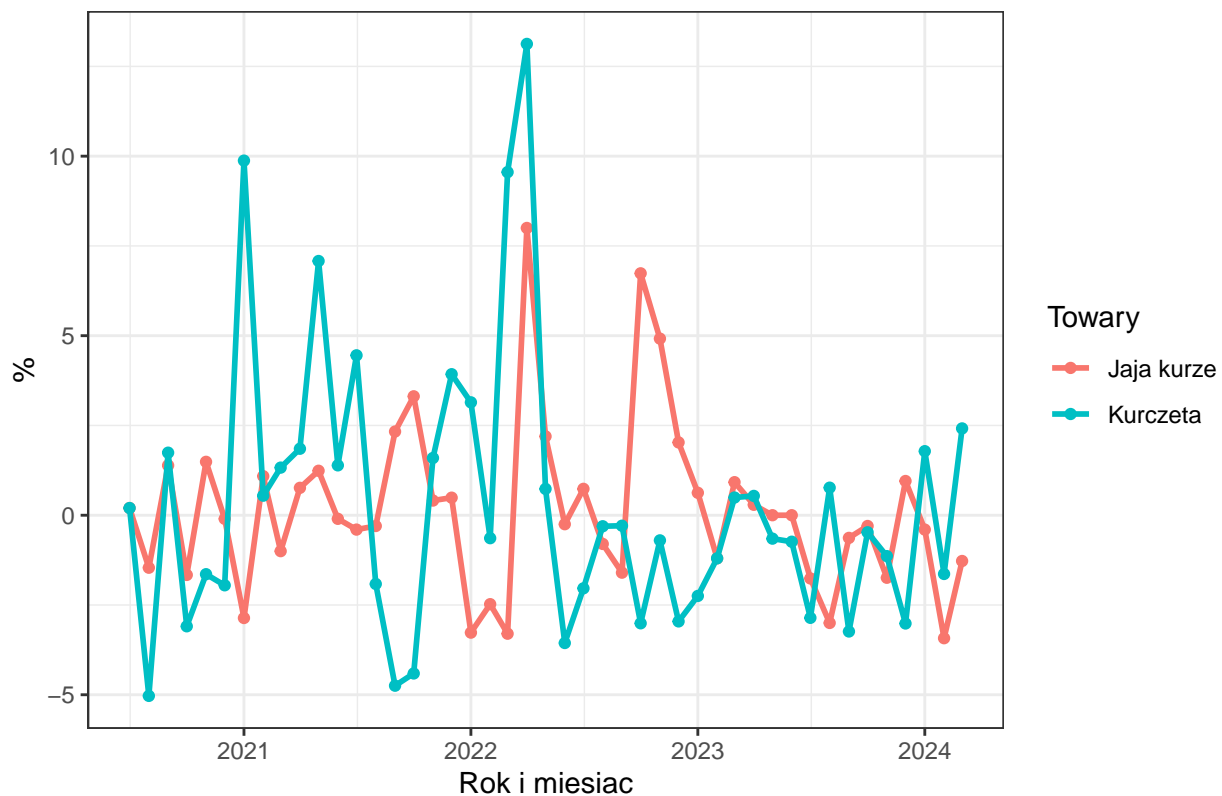
```
## Saving 6.5 x 4.5 in image
```

Względna różnica

```
  plot_data <- tibble(date = infl_mies$date, chicken_i = chicken$inflation - infl_mies$inflatio
  butter_i = butter$inflation - infl_mies$inflation, cheese_i = cheese$inflation - infl_mies$in
  eggs_i = eggs$inflation - infl_mies$inflation, bread_i = bread$inflation - infl_mies$inflatio

plot <- ggplot(plot_data, aes(date)) +
  geom_line(aes(y = eggs_i, color = "Jaja kurze"), size = 1) +
  geom_point(aes(y = eggs_i, color = "Jaja kurze")) +
  geom_line(aes(y = chicken_i, color = "Kurczęta"), size = 1) +
  geom_point(aes(y = chicken_i, color = "Kurczęta")) +
  labs(x = "Rok i miesiąc", y = "%", color = "Towary") +
  ggtitle("Względna różnica pomiędzy inflacją a inflacją rzeczywistą produktów")

plot
```
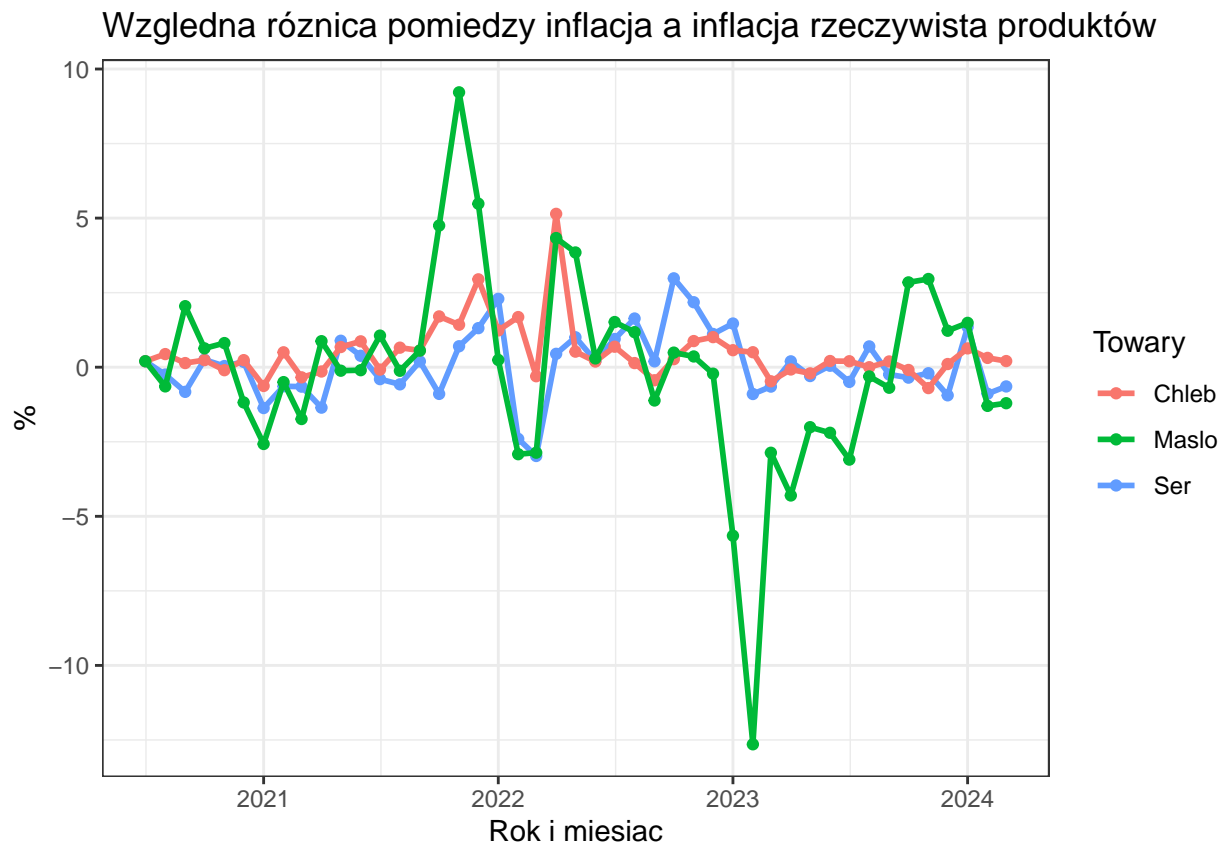
```
ggsave("r_wzgl_towary_jedz1.png")
```

```
## Saving 6.5 x 4.5 in image
```

Względna r 2

```
plot_data <- tibble(date = infl_mies$date, chicken_i = chicken$inflation - infl_mies$inflation
  butter_i = butter$inflation - infl_mies$inflation, cheese_i = cheese$inflation - infl_mies$in
  eggs_i = eggs$inflation - infl_mies$inflation, bread_i = bread$inflation - infl_mies$inflatio

plot <- ggplot(plot_data, aes(date)) +
  geom_line(aes(y = cheese_i, color = "Ser "),
   size = 1) +
  geom_point(aes(y = cheese_i, color = "Ser ")) +
  geom_line(aes(y = bread_i, color = "Chleb"), size = 1) +
  geom_point(aes(y = bread_i, color = "Chleb")) +
  geom_line(aes(y = butter_i, color = "Masło"), size = 1) +
  geom_point(aes(y = butter_i, color = "Masło")) +
  labs(x = "Rok i miesiąc", y = "%", color = "Towary") +
  ggtitle("Względna różnica pomiędzy inflacją a inflacją rzeczywistą produktów")

plot
```


Wzgledna róznica pomiedzy inflacja a inflacja rzeczywista produktów

```
ggsave("r_wzgl_towary_jedz2.png")
```

```
## Saving 6.5 x 4.5 in image
```

Wykres znormalizowanego wzrostu ceny dla produktów spożywczych

```
plot_data <- tibble(date = infl_mies$date, chicken_i = chicken$norm,
  butter_i = butter$norm, cheese_i = cheese$norm,
  eggs_i = eggs$norm, bread_i = bread$norm, infl_i = infl_mies$norm)

plot <- ggplot(plot_data, aes(date)) +
  geom_line(aes(y = cheese_i, color = "Ser "),
   size = 1) +
  geom_line(aes(y = bread_i, color = "Chleb"), size = 1) +
  geom_line(aes(y = eggs_i, color = "Jaja kurze"), size = 1) +
  geom_line(aes(y = butter_i, color = "Masło"), size = 1) +
  geom_line(aes(y = chicken_i, color = "Kurczęta patroszone"), size = 1) +
  geom_line(aes(y = infl_i, color = "Inflacja"), size = 1) +
  labs(x = "Rok i miesiąc", y = "", color = "Towary") +
  ggtitle("Zmiany cen")

plot
```
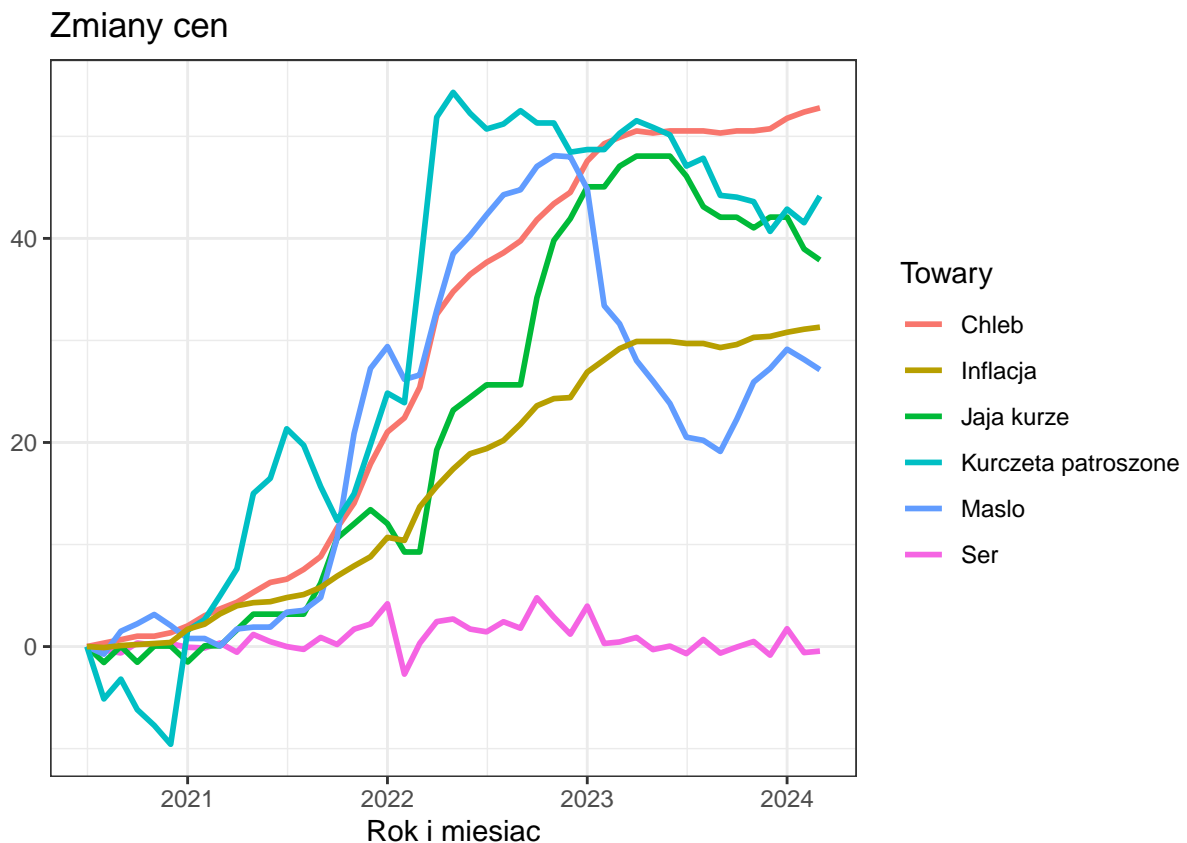
Wykres dla znormailzowanego wzrostu cen produktów nieżywnościowych

```
plot_data <- tibble(date = infl_mies$date, gaz_norm = gaz$norm,
  heat_norm = heat$norm, water_norm = water$norm,
  energy_norm = energy$norm, infl_norm = infl_mies$norm )

plot <- ggplot(plot_data, aes(date)) +
  geom_line(aes(y = gaz_norm, color = "Gaz ziemny wysokometanowy z sieci "),
   size = 1) +
  geom_line(aes(y = heat_norm, color = "Centralne ogrzewanie"), size = 1) +
  geom_line(aes(y = water_norm, color = "Ciepła woda"), size = 1) +
  geom_line(aes(y = energy_norm, color = "Energia elektryczna"), size = 1) +
  geom_line(aes(y = infl_norm, color = "Inflacja"), size = 1) +
  labs(x = "Rok i miesiąc", y = "", color = "Towary") +
  ggtitle("Zmiany cen") +
  theme(
    legend.position = c(.95, .95),
    legend.justification = c("right", "top"),
    legend.box.just = "right",
    legend.margin = margin(6, 6, 6, 6)
    ) +
  scale_x_date(date_labels = "%Y-%m")

plot
```

```
## Warning: Removed 3 rows containing missing values or values outside the scale
## range ('geom_line()').
```

Zmiany cen
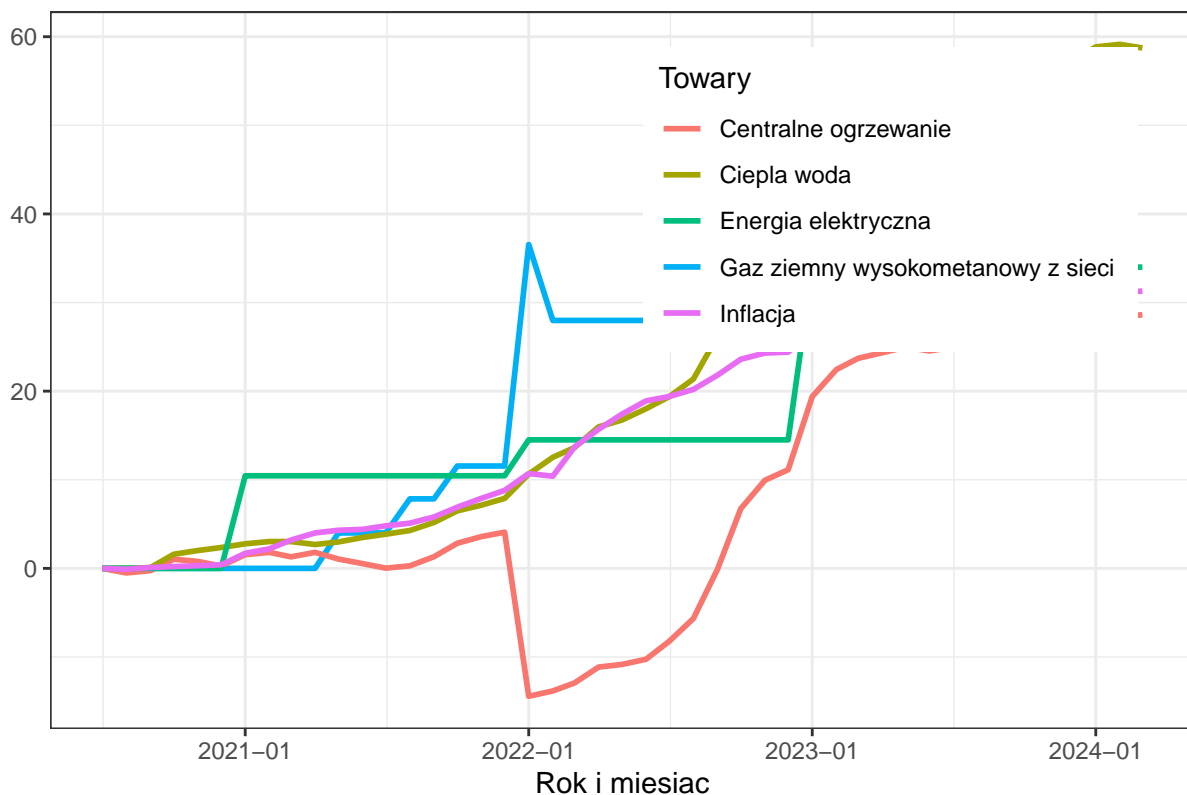
Zadanie 2

Inflacja oraz nakład na badania i rozwój dla lat od 2000-2023

```r
infl = read_csv2("inflacja.csv", locale=locale(encoding="latin1"),
  show_col_types = FALSE)
```

```
## i Using "','" as decimal and "'.'" as grouping mark. Use `read_delim()` for more control.
```

```r
infl = infl %>% select(Rok, Wartosc)
infl = infl %>% arrange(Rok)
abs_value <- numeric(length(infl$Wartosc))
abs_value[1] =  infl$Wartosc[1] - 100.0
for (i in 2:length(infl$Wartosc)){
    abs_value[i] <-  infl$Wartosc[i] - 100 + abs_value[i-1]
}
infl = infl %>% mutate(inflation = infl$Wartosc - 100)
modif_inflation <- tibble(rok = infl$Rok, norm =abs_value, inflation = infl$inflation)
modif_inflation  <- modif_inflation  %>% filter(rok >= 1999, rok <= 2022)
ggplot(data = modif_inflation , aes(x=rok, y = norm)) + geom_point() +
  labs(x = "Rok", y = "Inflacja") +
  ggtitle("Znormalizowany wzrost ceny na podstawie inflacji lata 2000-2023")
```

Znormalizowany wzrost ceny na podstawie inflacji lata 2000–2023
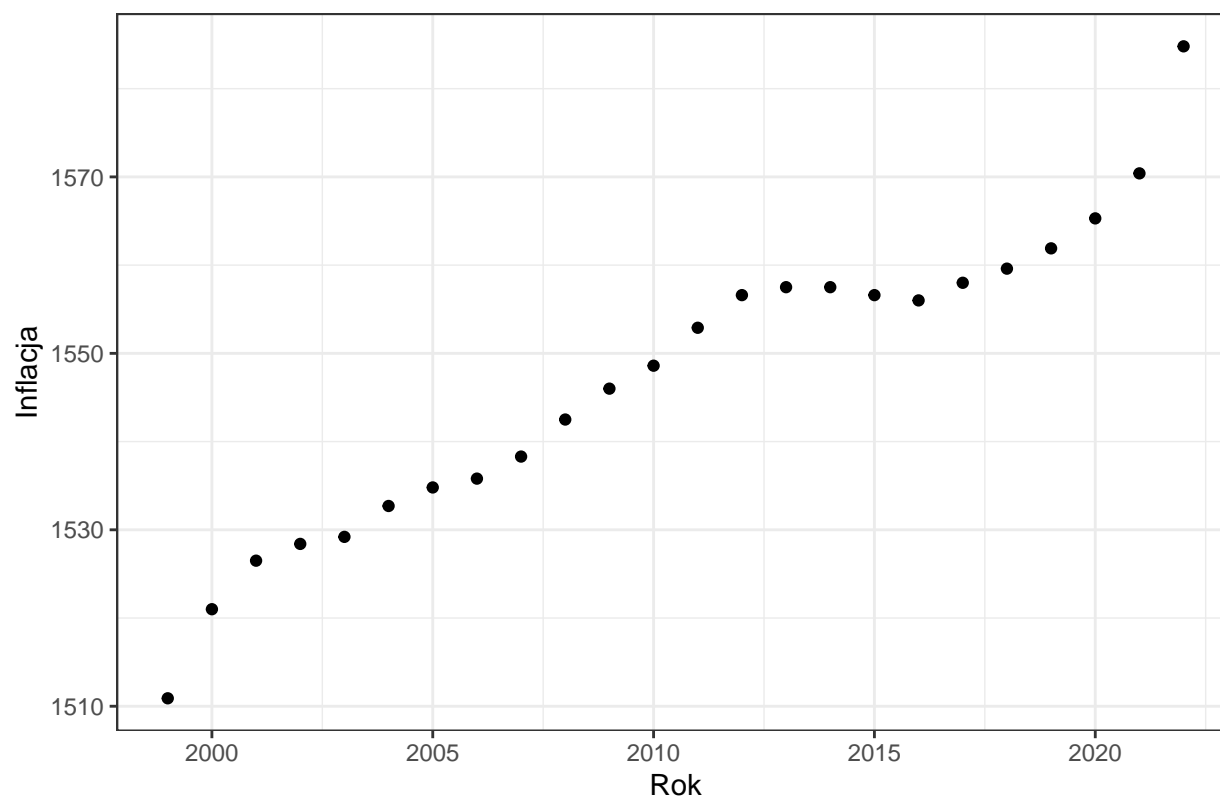

```
ggplot(data = modif_inflation , aes(x=rok, y = inflation)) + geom_line() + geom_point()
```
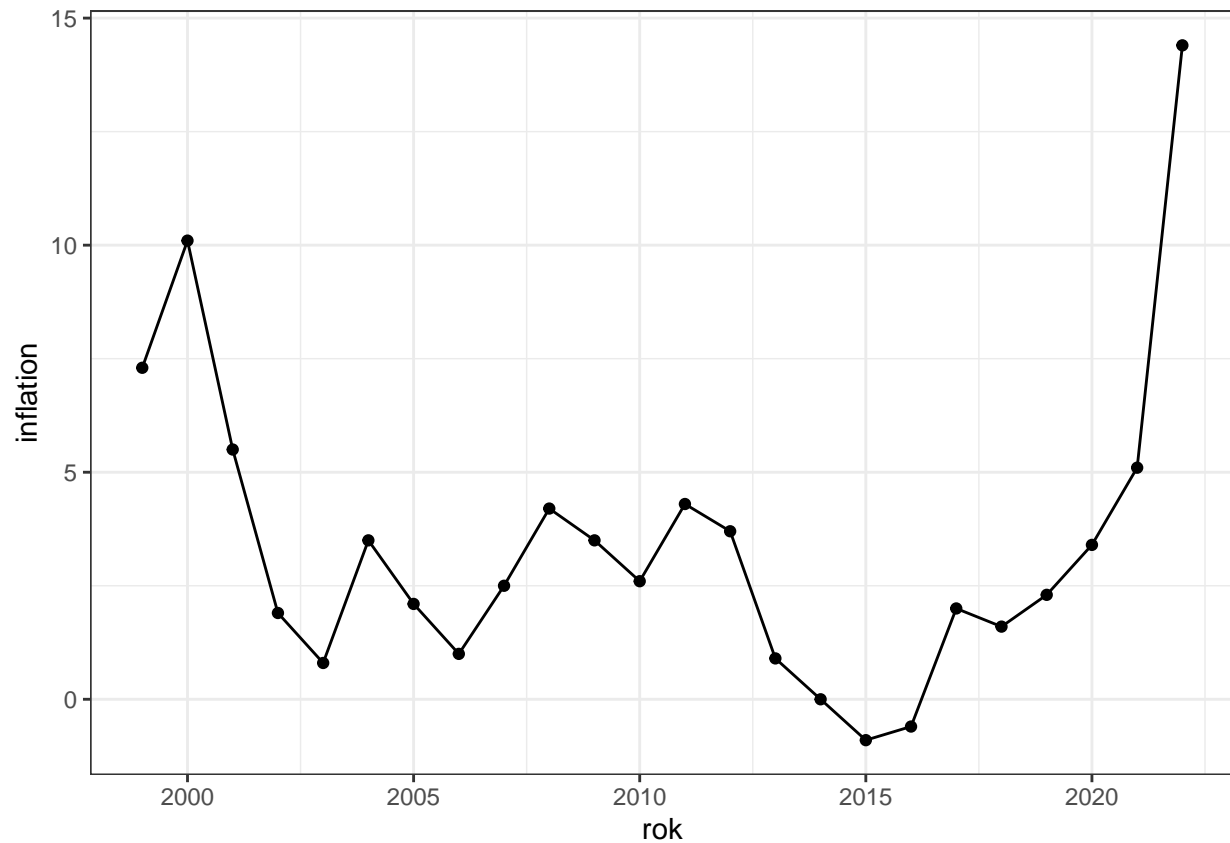
```r
labs(x = "Rok", y = "Inflacja")
```

```
## $x
## [1] "Rok"
##
## $y
## [1] "Inflacja"
##
## attr(,"class")
## [1] "labels"
```

```r
brp = read_csv2("brp.csv", , show_col_types = FALSE)
```

```
## i Using "','" as decimal and "'.'" as grouping mark. Use `read_delim()` for more control.
```

```r
bp = brp %>% select(id_pozycja_2, id_daty, wartosc, id_przekroj)
bp = brp %>% filter(id_pozycja_2 == 660892)
bp = bp %>% arrange(id_daty)
prod = brp %>% filter(id_przekroj == 16)
prod = prod %>% arrange(id_daty)
bp = bp %>% mutate(wart_calk = prod$wartosc * wartosc)
```

```
gov = brp %>% filter(id_pozycja_2 == 546159)
gov = gov %>% arrange(id_daty)
gov = gov %>% mutate(wart_calk = prod$wartosc * wartosc)
bes = brp %>% filter(id_pozycja_2 == 546157)
bes = bes %>% arrange(id_daty)
bes = bes %>% mutate(wart_calk = prod$wartosc * wartosc)
hes = brp %>% filter(id_pozycja_2 == 546167)
hes = hes %>% arrange(id_daty)
hes = hes %>% mutate(wart_calk = prod$wartosc * wartosc)
ggplot(data = bp, aes(x=id_daty, y = wart_calk)) + geom_point() + geom_line() +
labs(x = "Rok", y = "Wartość [zł]") +
  ggtitle("Wykres nakładu na badania i rozwój w poszczególnych latach")
```

Wykres nakladu na badania i rozwój w poszczególnych latach
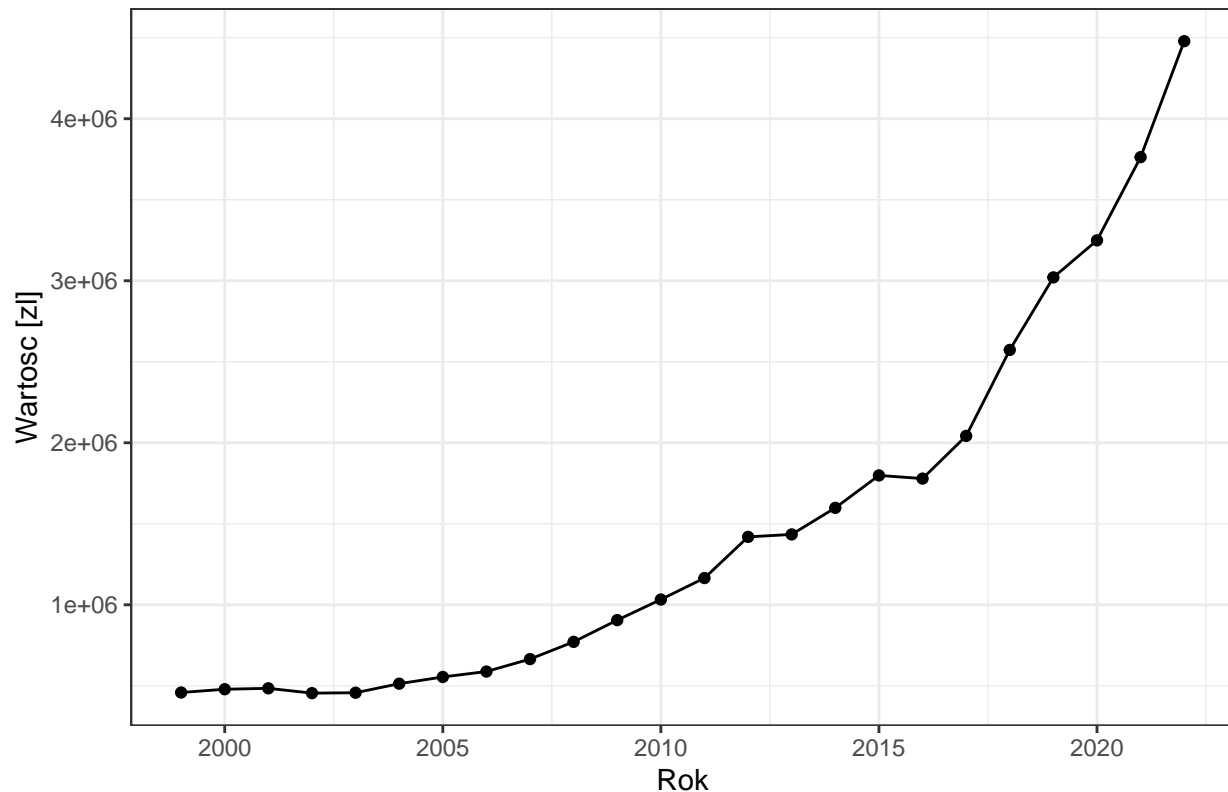
Nałożone na siebie wartości inflacji oraz nakładów na badania i rozwój

```
bp$norm = normalise(bp$wart_calk)
bp$inflation = calc_infl(bp$wart_calk)
offset = modif_inflation$norm[1]
modif_inflation <- modif_inflation %>% mutate(normal = modif_inflation$norm - offset)
plot_data <- tibble(date = modif_inflation$rok, infl_norm = modif_inflation$inflation, b_norm =
```

```
plot <- ggplot(plot_data, aes(date)) +
  geom_line(aes(y = b_norm, color = "Badania i rozwój"), size = 1) +
  geom_point(aes(y = b_norm, color = "Badania i rozwój")) +
  geom_line(aes(y = infl_norm, color = "Inflacja"), size = 1) +
  geom_point(aes(y = infl_norm, color = "Inflacja")) +
  labs(x = "Rok", y = "%", color = "") +
  ggtitle("Inflacja nakładów na badania i rozwój oraz inflacja") +
  theme(legend.position = "bottom")
plot
```


Inflacja nakladów na badania i rozwój oraz inflacja
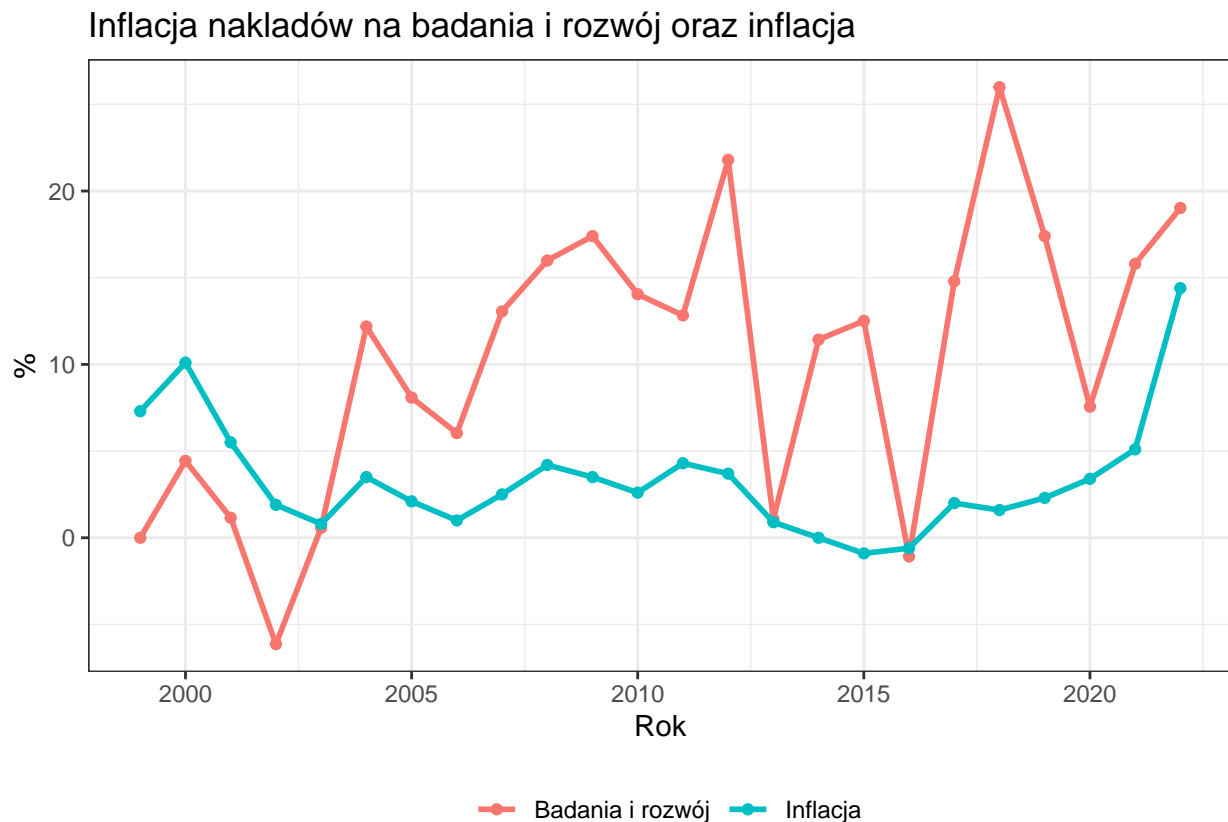
```
ggsave("badania_rozw_infl.png")
```

```
## Saving 6.5 x 4.5 in image
```

Różne sektory

```
plot_data <- tibble(date = hes$id_daty, hes = hes$wart_calk, gov = gov$wart_calk, bes = bes$war
plot <- ggplot(plot_data, aes(date)) +
  geom_line(aes(y = hes, color = "Hes"), size = 1) +
  geom_point(aes(y = hes, color = "Hes")) +
  geom_line(aes(y = bes, color = "Bes"), size = 1) +
```

```
  geom_point(aes(y = bes, color = "Bes")) +
  geom_line(aes(y = gov, color = "GOV"), size = 1) +
  geom_point(aes(y = gov, color = "GOV")) +
  geom_line(aes(y = og, color = "Całkowita"), size = 1) +
  geom_point(aes(y = og, color = "Całkowita")) +
  labs(x = "Rok", y = "Wartość [zł]", color = "") +
  ggtitle("Nakłady na poszczególne sektory") +
  theme(legend.position = "bottom")
plot
```

```
## Warning: Removed 1 row containing missing values or values outside the scale
## range ('geom_point()').
```
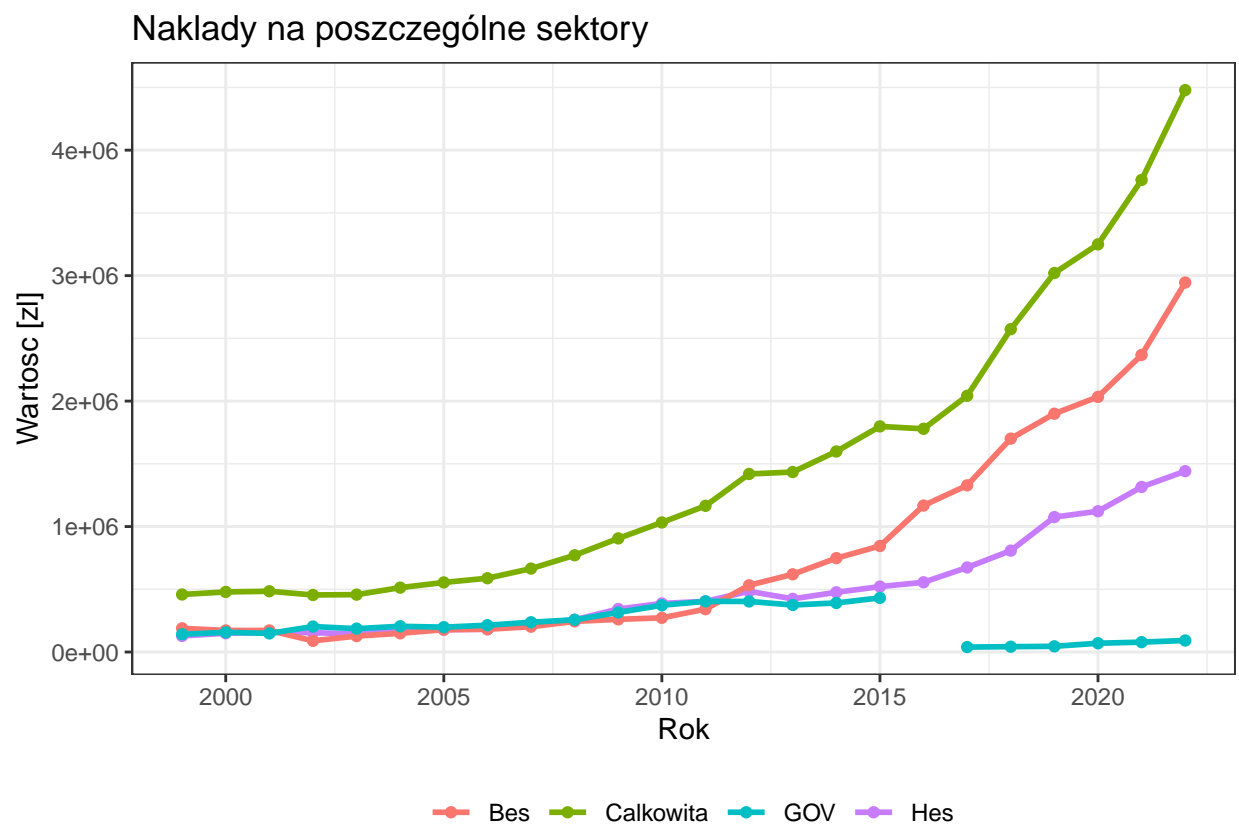


```
ggsave("bR_sektory.png")
```

```
## Saving 6.5 x 4.5 in image
```

```
## Warning: Removed 1 row containing missing values or values outside the scale
## range ('geom_point()').
```

Wykres z procentową zmianą ceny

```
plot_data <- tibble(date = modif_inflation$rok, infl_norm = modif_inflation$normal, b_norm = bp
plot <- ggplot(plot_data, aes(date)) +
  geom_line(aes(y = b_norm, color = "Badania i rozwój"), size = 1) +
  geom_point(aes(y = b_norm, color = "Badania i rozwój")) +
  geom_line(aes(y = infl_norm, color = "Inflacja"), size = 1) +
  geom_point(aes(y = infl_norm, color = "Inflacja"))+
  labs(x = "Rok", y = "%", color = "") +
  ggtitle("Nakłady na badania i rozwój oraz inflacja") +
  theme(legend.position = "bottom")
plot
```

Naklady na badania i rozwój oraz inflacja