

SAD- projekt 1

Autorzy

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Wykożystane pakiety i ustawiena

```
require(tidyverse)
theme_set(theme_bw())
```

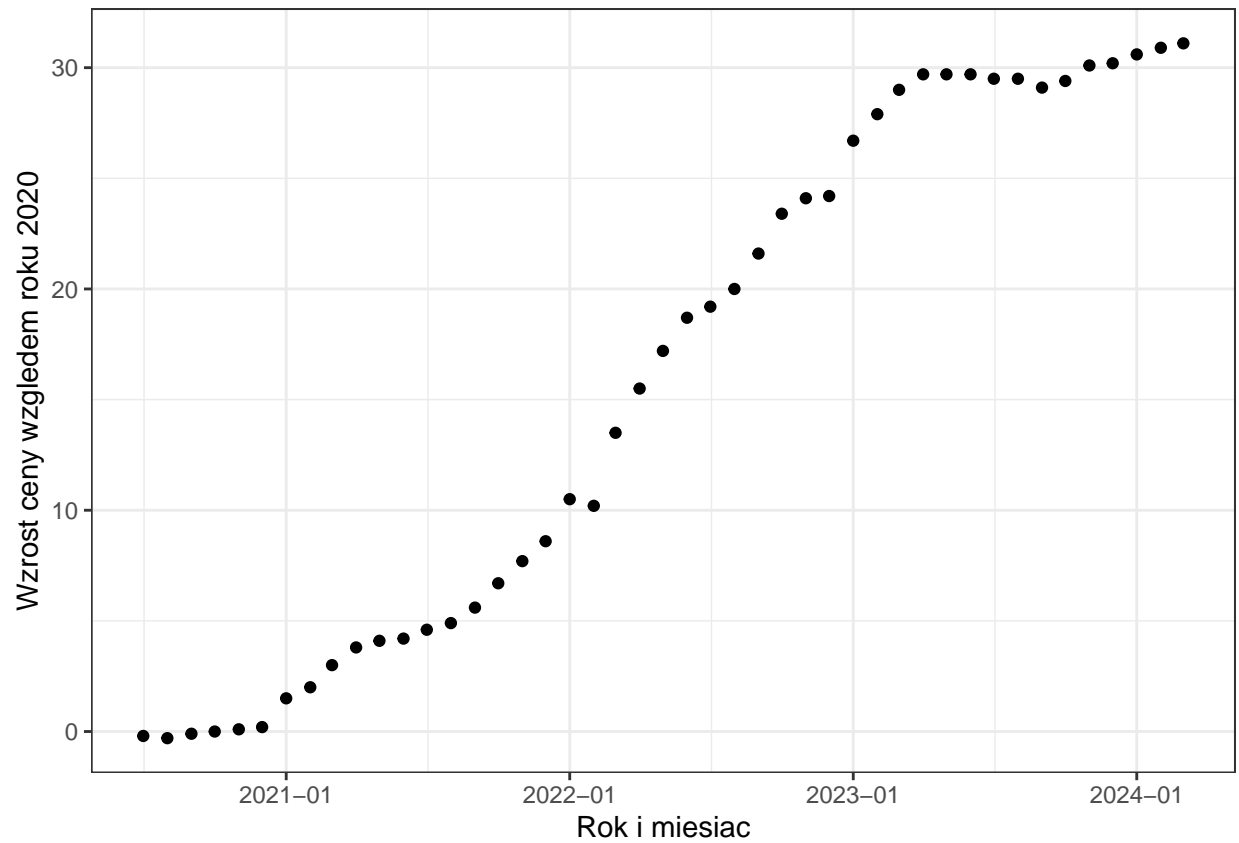
Zadanie 1

Inflacja od 2020-07 do 2024-03

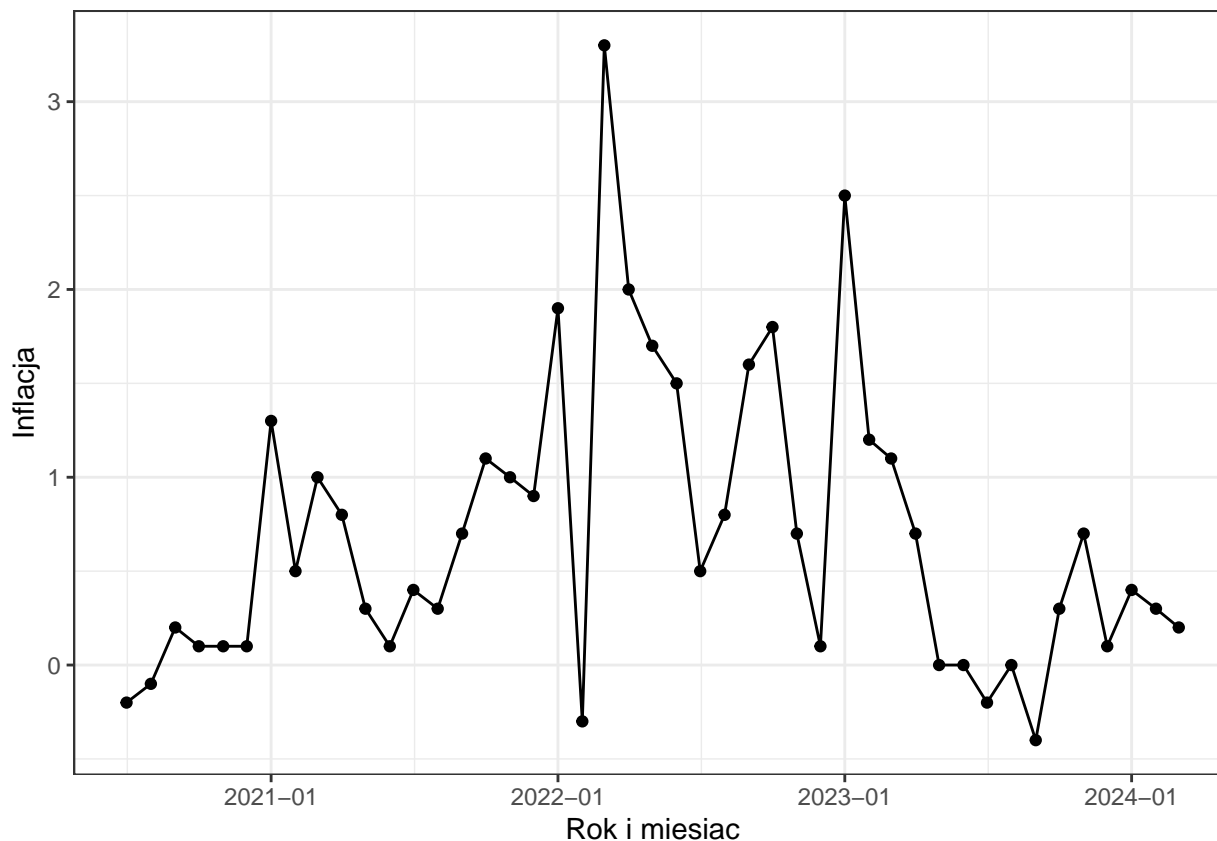
```
infl_mies <- read_csv2("inflacja_mies.csv", locale=locale(encoding="latin1"),
  show_col_types = FALSE)
```

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 miesiac", 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")
```



```
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.

```
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)
```

```

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()').

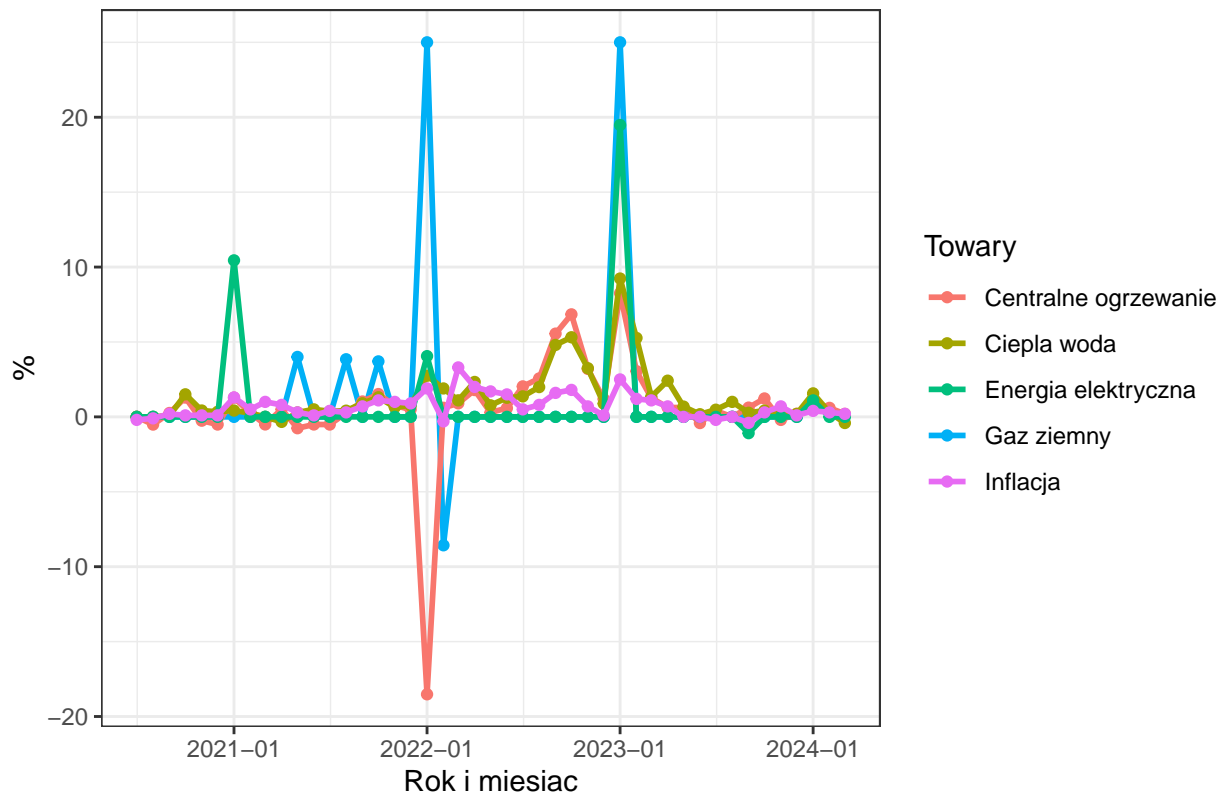
```

```

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

```

Inflacja towarów



```
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

```
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$in
  energy_norm = energy$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")) +
```

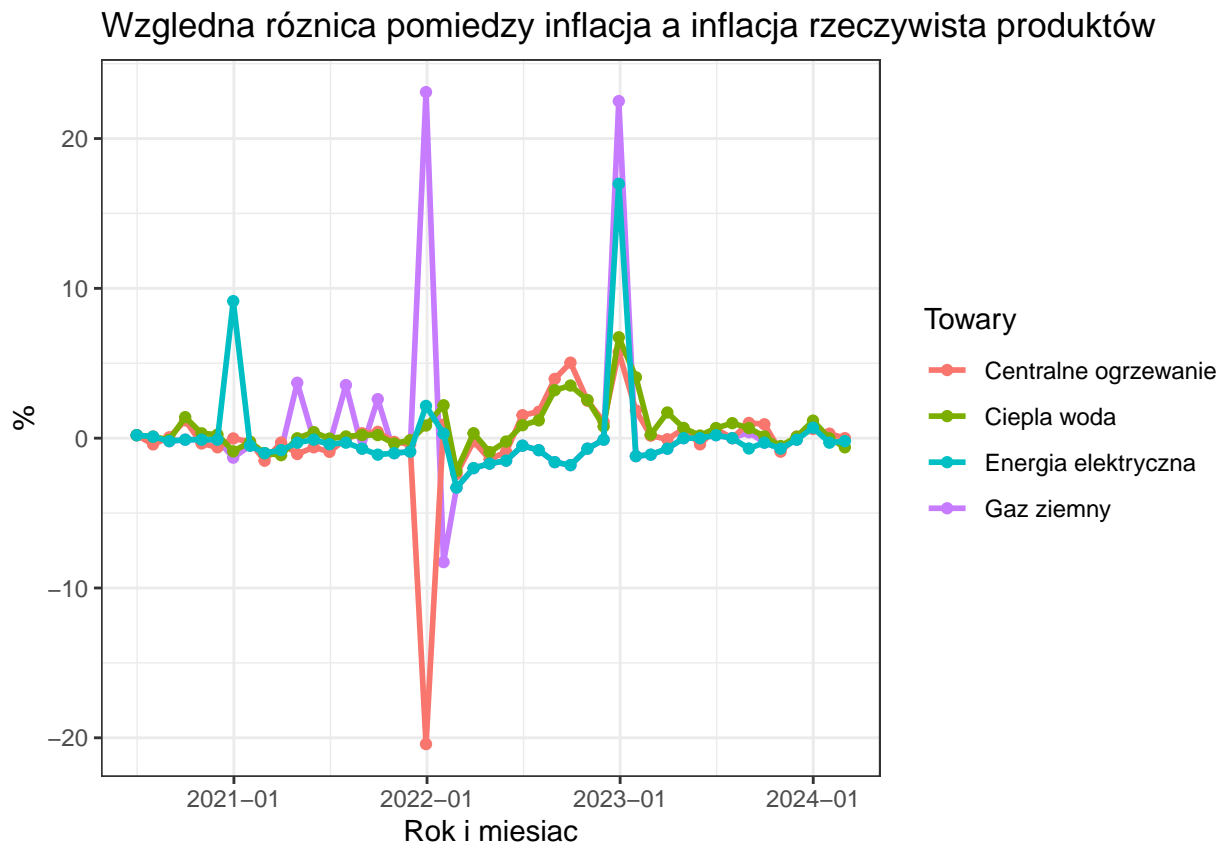
```
geom_line(aes(y = energy_norm, color = "Energia elektryczna"), size = 1) +
geom_point(aes(y = energy_norm, color = "Energia elektryczna")) +
labs(x = "Rok i miesiąc", y = "%", color = "Towary") +
ggtitle("Względna różnica pomiędzy inflacją a inflacją rzeczywistą produktów") +

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()').
```



```
ggsave("r_wzgl_towary_nie_jedz.png")
```

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

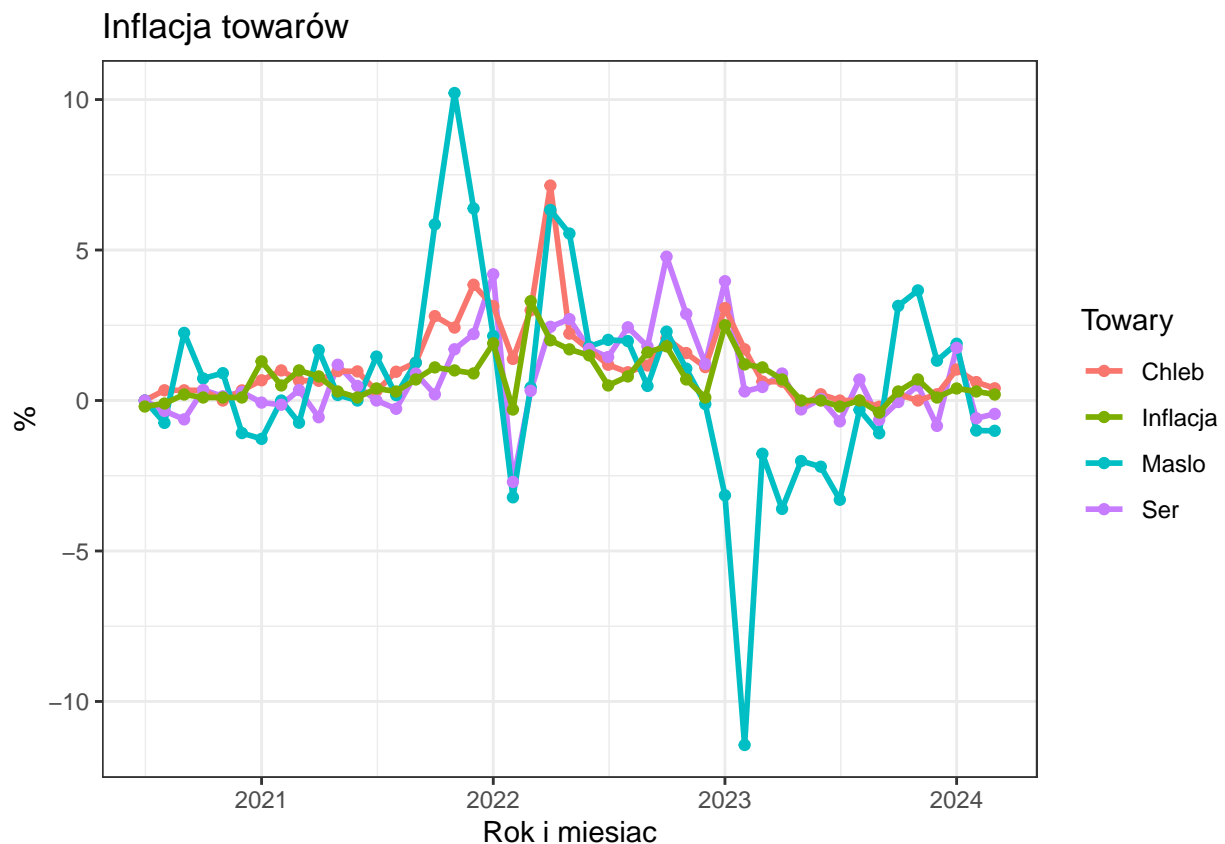
```
## Warning: Removed 3 rows containing missing values or values outside the scale range ('geom_
## Removed 3 rows containing missing values or values outside the scale range ('geom_point()')
```

Wykres inflacji dla produktów spożywczych

```
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")
```

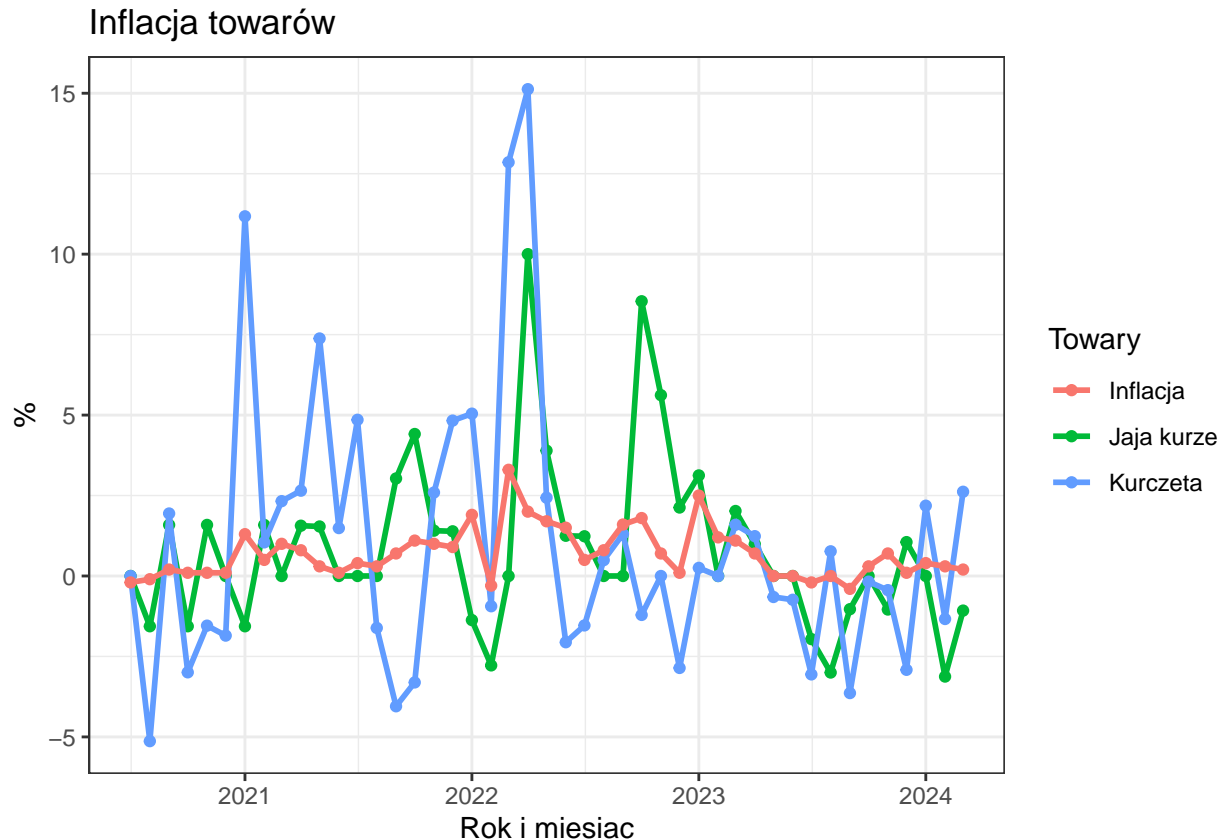
```
## Saving 6.5 x 4.5 in image
```

Wykres inflacji 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
```

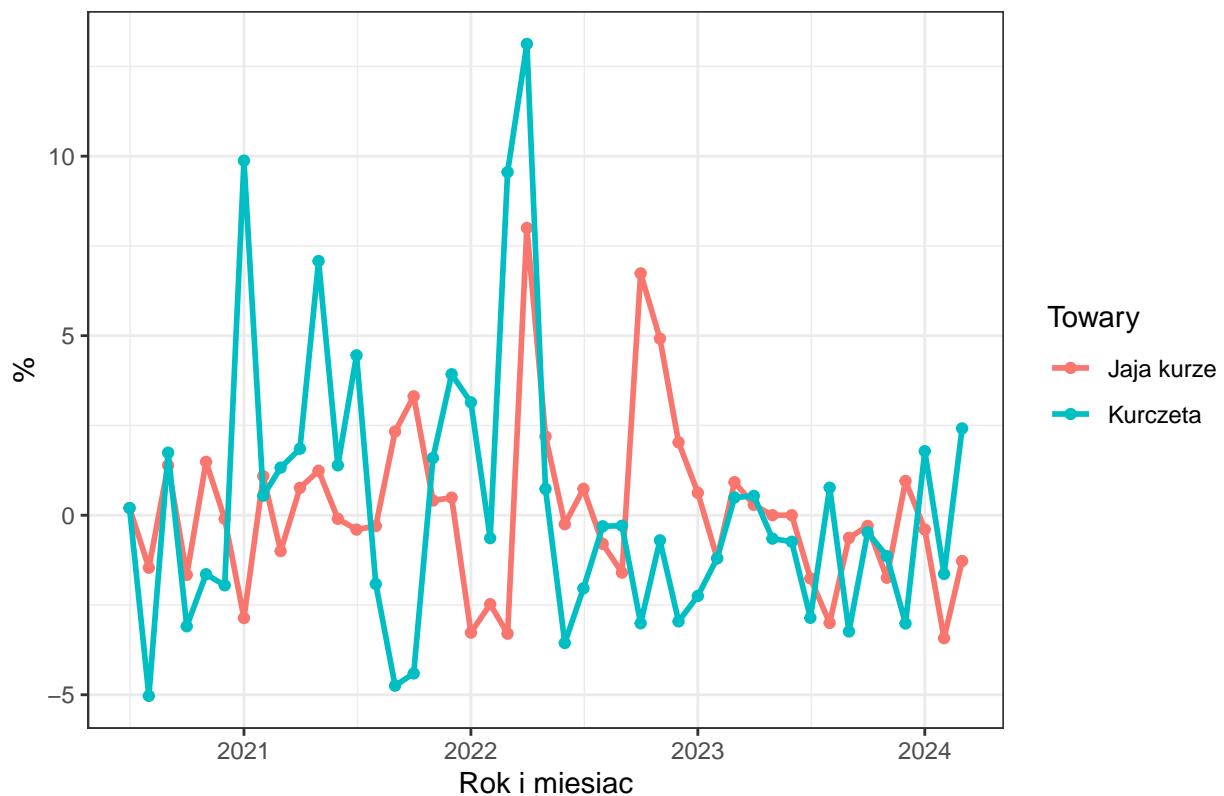
Względna różnica

```
plot_data <- tibble(date = infl_mies$date, chicken_i = chicken$inflation - infl_mies$inflation,
  butter_i = butter$inflation - infl_mies$inflation, cheese_i = cheese$inflation - infl_mies$inflation,
  eggs_i = eggs$inflation - infl_mies$inflation, bread_i = bread$inflation - 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")) +
  labs(x = "Rok i miesiąc", y = "%", color = "Towary") +
  ggtitle("Względna różnica pomiędzy inflacją a inflacją rzeczywistą produktów")

plot
```

Względna różnica pomiędzy inflacją a inflacją rzeczywistą produktów



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

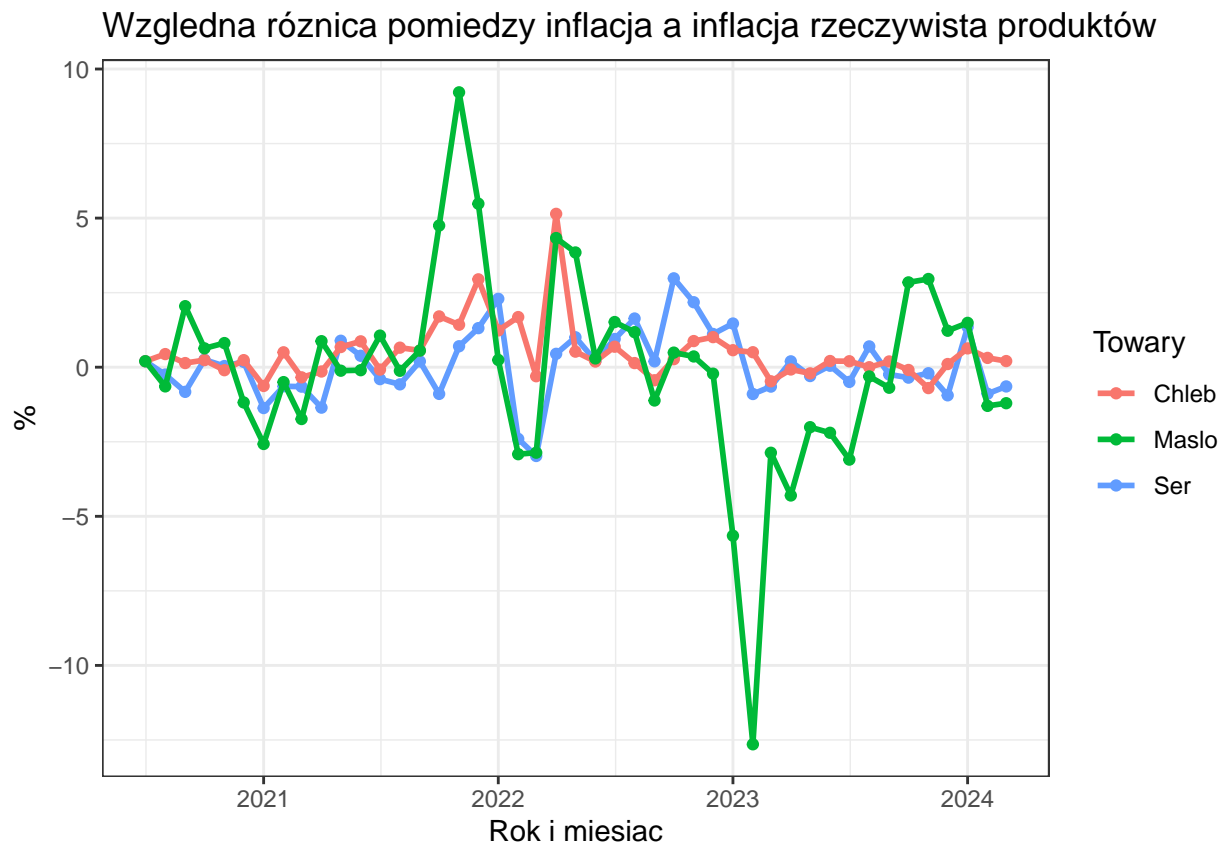
```
## Saving 6.5 x 4.5 in image
```

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$inflation,  
  eggs_i = eggs$inflation - infl_mies$inflation, bread_i = bread$inflation - infl_mies$inflation)
```

```
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



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

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

Wartość koszyka wynikająca z inflacji i wartość rzeczywista produktów niejedzeniowe

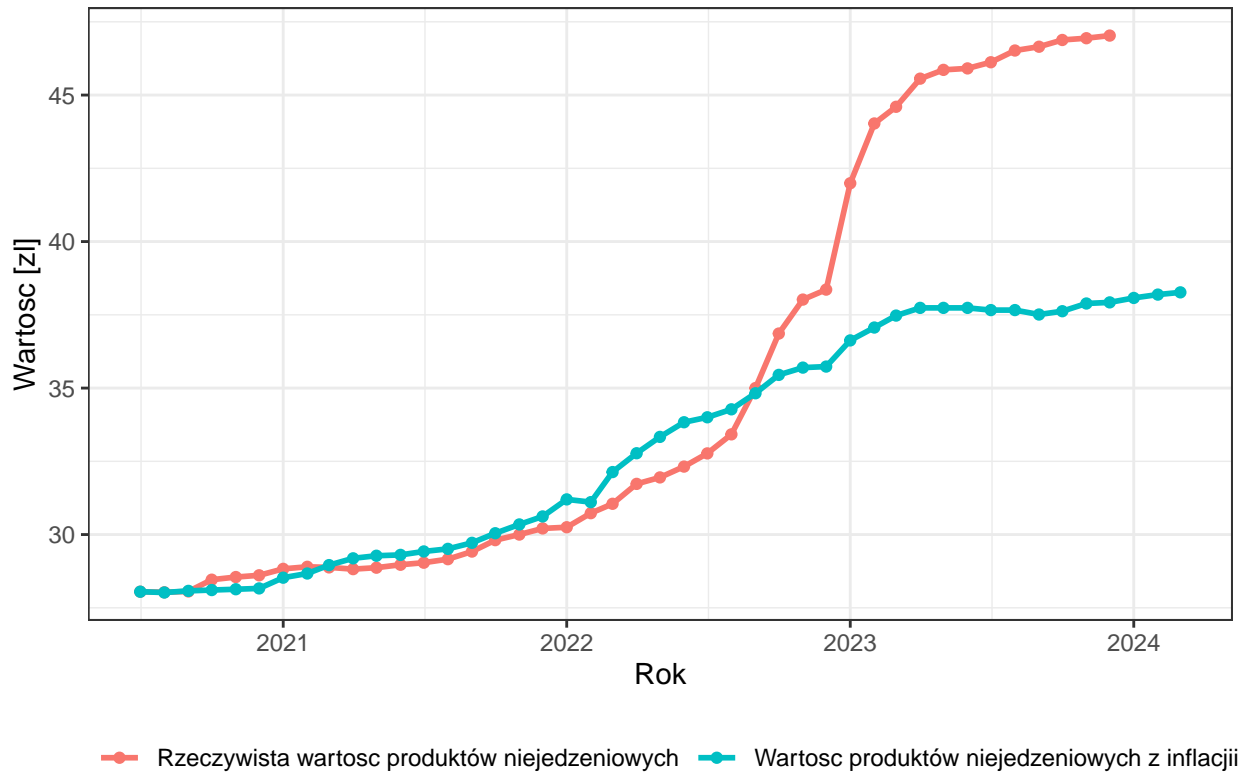
```
trolley = gaz$wartosc + heat$wartosc + water$wartosc + energy$wartosc
infl_trolley<- numeric(length(infl_mies$inflation))
infl_trolley[1] = trolley[1]
for(i in 2:length(infl_mies$inflation)){
  infl_trolley[i] = infl_trolley[i-1] + infl_trolley[i-1] * infl_mies$inflation[i]/100.0
}

plot_data <- tibble(date = infl_mies$date, tr = trolley, infl_tr = infl_trolley)
plot <- ggplot(plot_data, aes(date)) +
  geom_line(aes(y = tr, color = "Rzeczywista wartość produktów niejedzeniowych"), size = 1) +
  geom_point(aes(y = tr, color = "Rzeczywista wartość produktów niejedzeniowych")) +
  geom_line(aes(y = infl_tr, color = "Wartość produktów niejedzeniowych z inflacji"), size = 1) +
  geom_point(aes(y = infl_tr, color = "Wartość produktów niejedzeniowych z inflacji")) +
  labs(x = "Rok", y = "Wartość [zł]", color = "") +
  ggtitle("Wartość koszyka wynikająca z inflacji i wartość rzeczywista produktów niejedzeniowych")
  theme(legend.position = "bottom")
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()').
```

Wartosc koszyka wynikajaca z inflacji i wartosc rzeczywista produktow nieje



```
ggsave("koszyki_pr_niejedz.png")
```

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

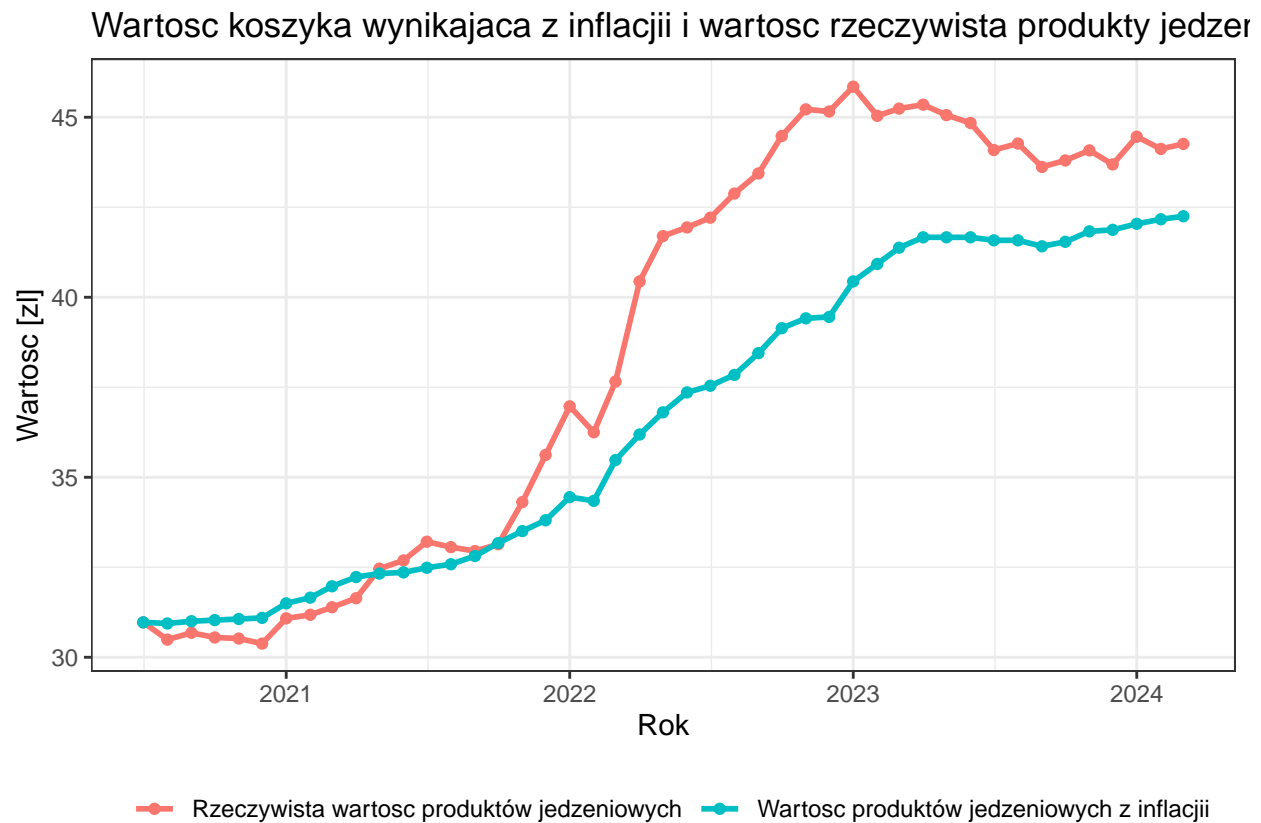
```
## Warning: Removed 3 rows containing missing values or values outside the scale range ('geom_
## Removed 3 rows containing missing values or values outside the scale range ('geom_point()')
```

Wykresy koszyka dla produktow spozywczych

```
trolley = bread$wartosc + eggs$wartosc + chicken$wartosc + butter$wartosc + cheese$wartosc
infl_trolley<- numeric(length(infl_mies$inflation))
infl_trolley[1] = trolley[1]
for(i in 2:length(infl_mies$inflation)){
  infl_trolley[i] = infl_trolley[i-1] + infl_trolley[i-1] * infl_mies$inflation[i]/100.0
}

plot_data <- tibble(date = infl_mies$date, tr = trolley, infl_tr = infl_trolley)
plot <- ggplot(plot_data, aes(date)) +
  geom_line(aes(y = tr, color = "Rzeczywista wartosc produktow jedzeniowych"), size = 1) +
  geom_point(aes(y = tr, color = "Rzeczywista wartosc produktow jedzeniowych")) +
  geom_line(aes(y = infl_tr, color = "Wartosc produktow jedzeniowych z inflacji"), size = 1)
```

```
geom_point(aes(y = infl_tr, color = "Wartość produktów jedzeniowych z inflacji")) +
labs(x = "Rok", y = "Wartość [zł]", color = "") +
ggtitle("Wartość koszyka wynikająca z inflacji i wartość rzeczywista produkty jedzeniowe") +
theme(legend.position = "bottom")
plot
```



```
ggsave("koszyki_pr_jedz.png")
```

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

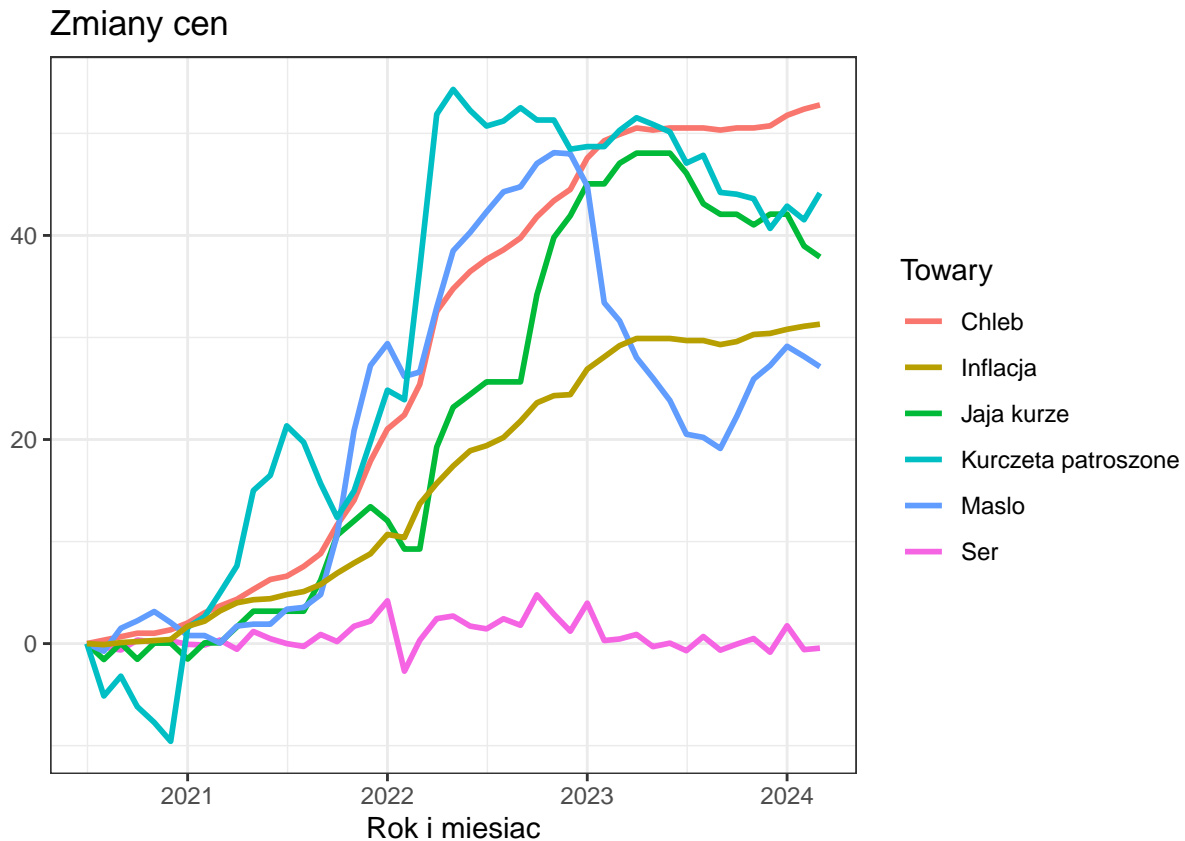
Wykres znormalizowanego wzrostu ceny dla produktów spożywczych

```
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 znornailzowanego 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")

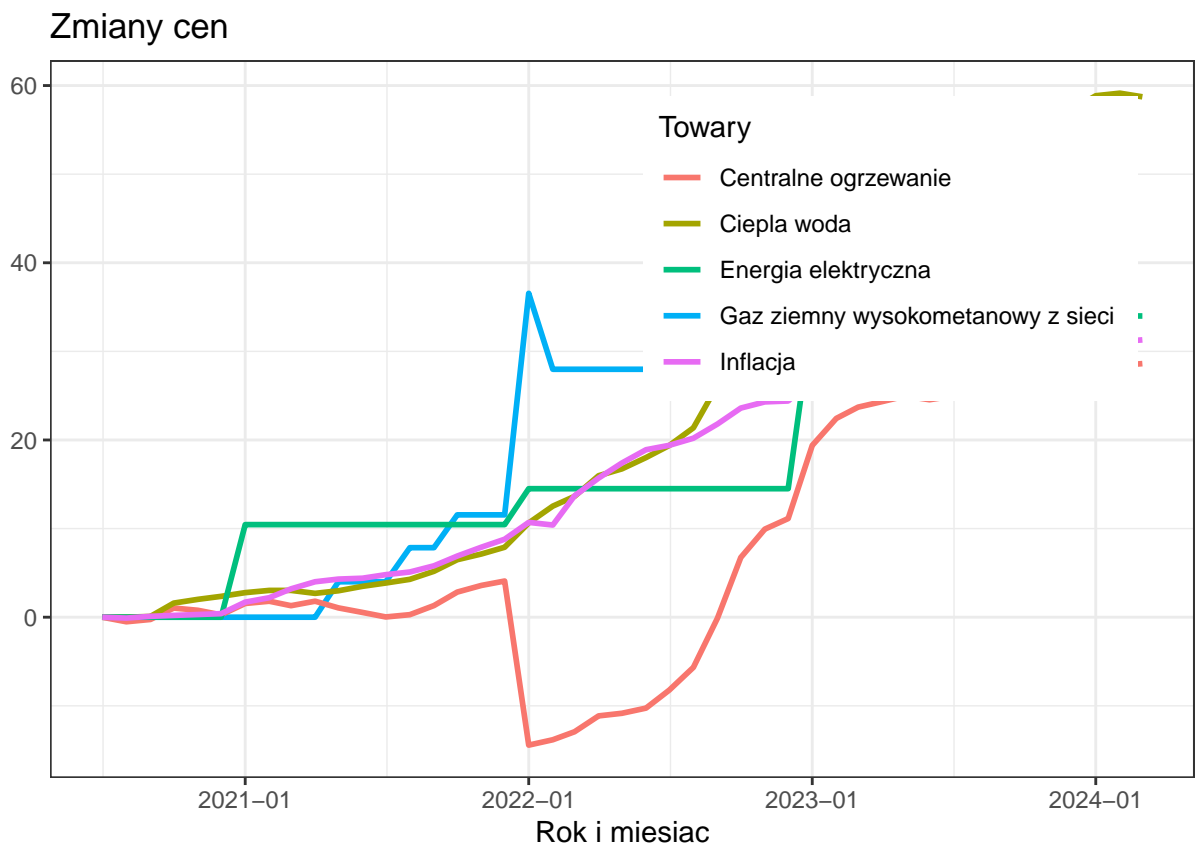
plot

```

```

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

```



```
## Zadanie 2
```

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

```

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.
```

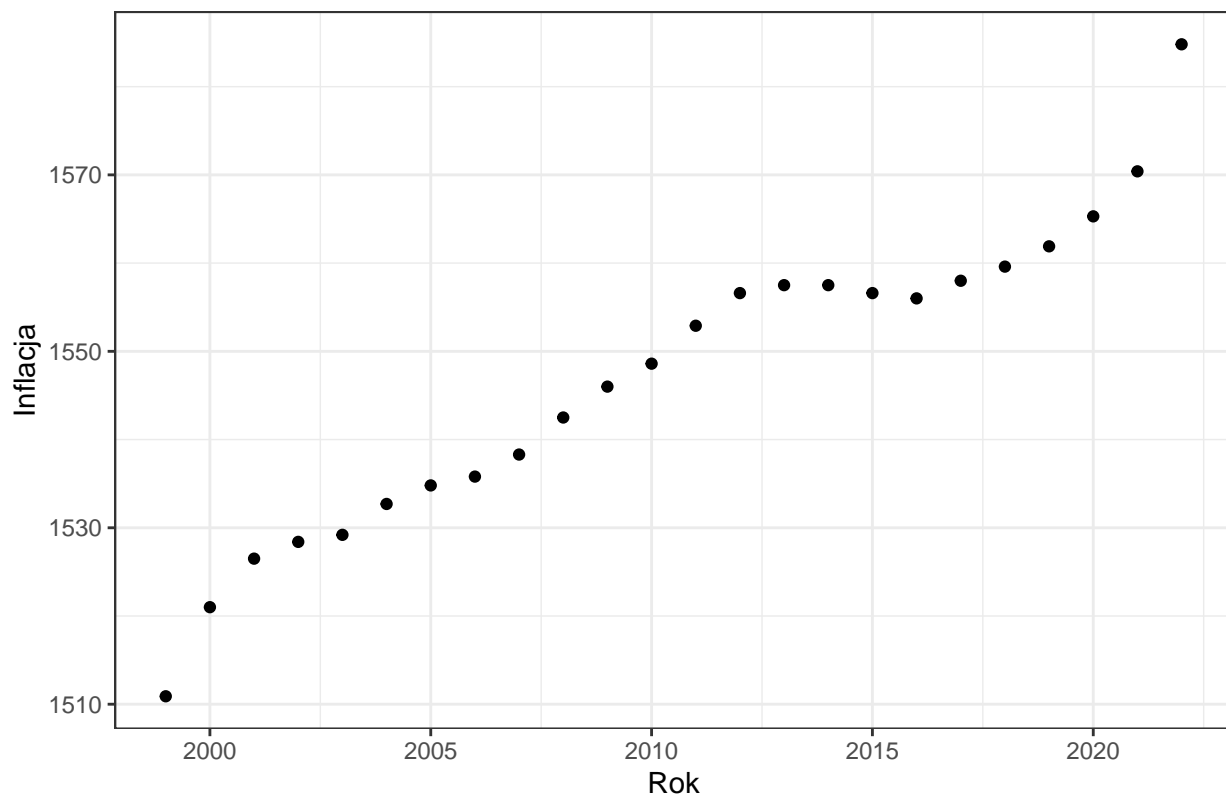


```

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")

```

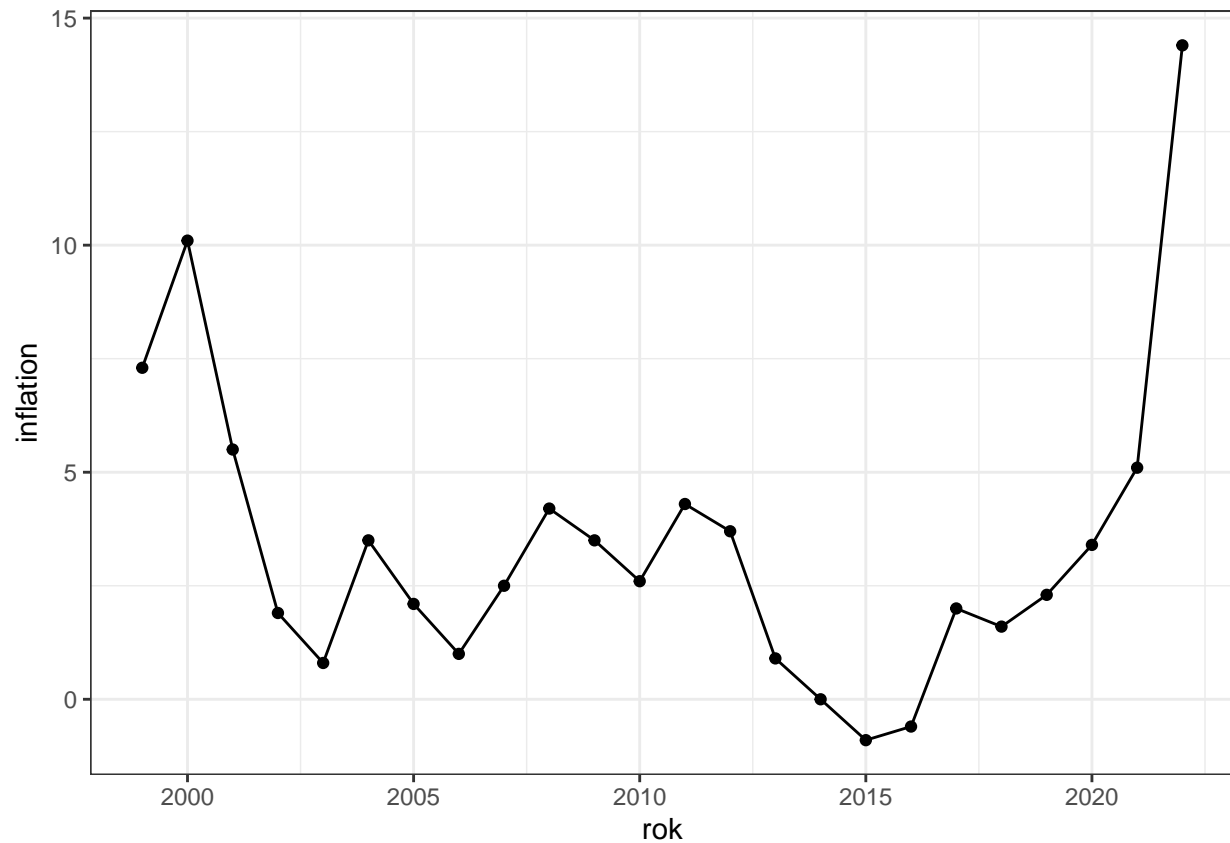
Znormalizowany wzrost ceny na podstawie inflacji lata 2000–2023



```

ggplot(data = modif_inflation , aes(x=rok, y = inflation)) + geom_line() + geom_point()

```



```
labs(x = "Rok", y = "Inflacja")
```

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

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

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

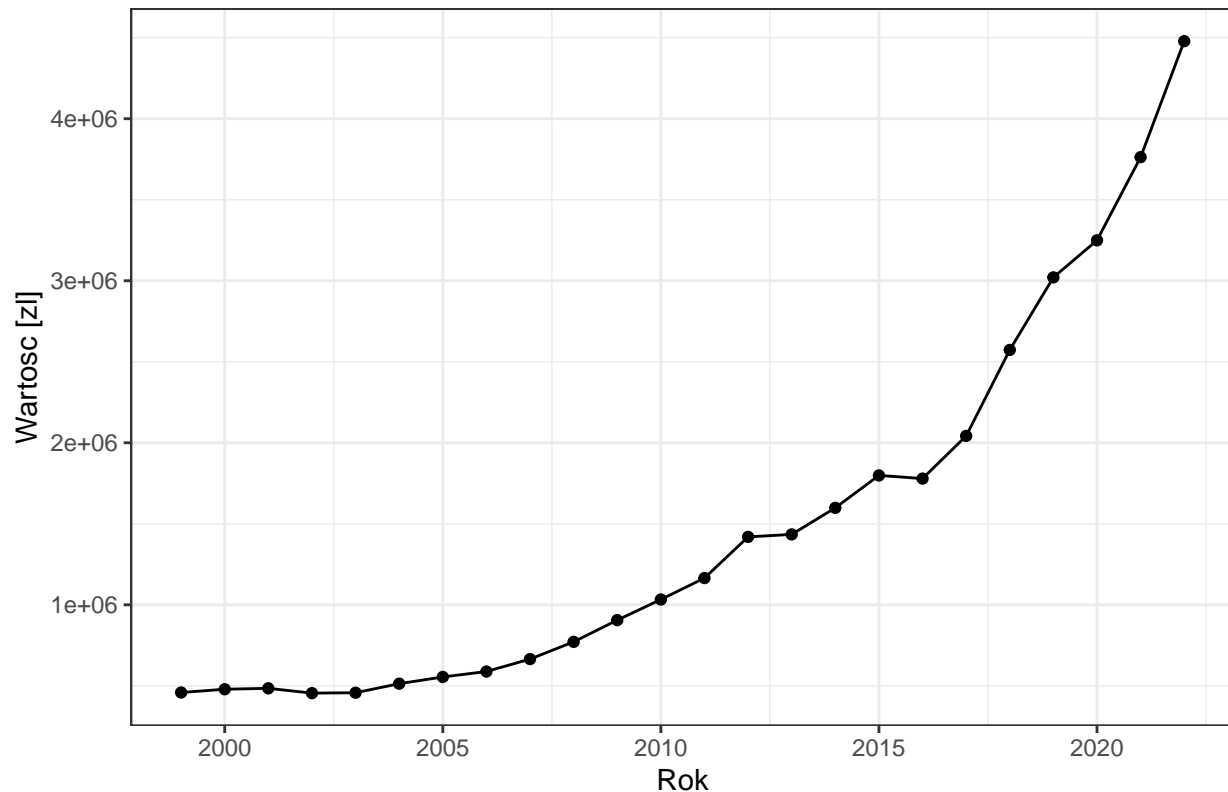
```
bp = brp %>% select(id_pozycja_2, id_daty, wartosc, id_przekroj)
bp = brp %>% filter(id_pozycja_2 == 660892)
bp = bp %>% arrange(id_daty)
prod = brp %>% filter(id_przekroj == 16)
prod = prod %>% arrange(id_daty)
bp = bp %>% mutate(wart_calk = prod$wartosc * wartosc)
```

```

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 nakładu na badania i rozwój w poszczególnych latach



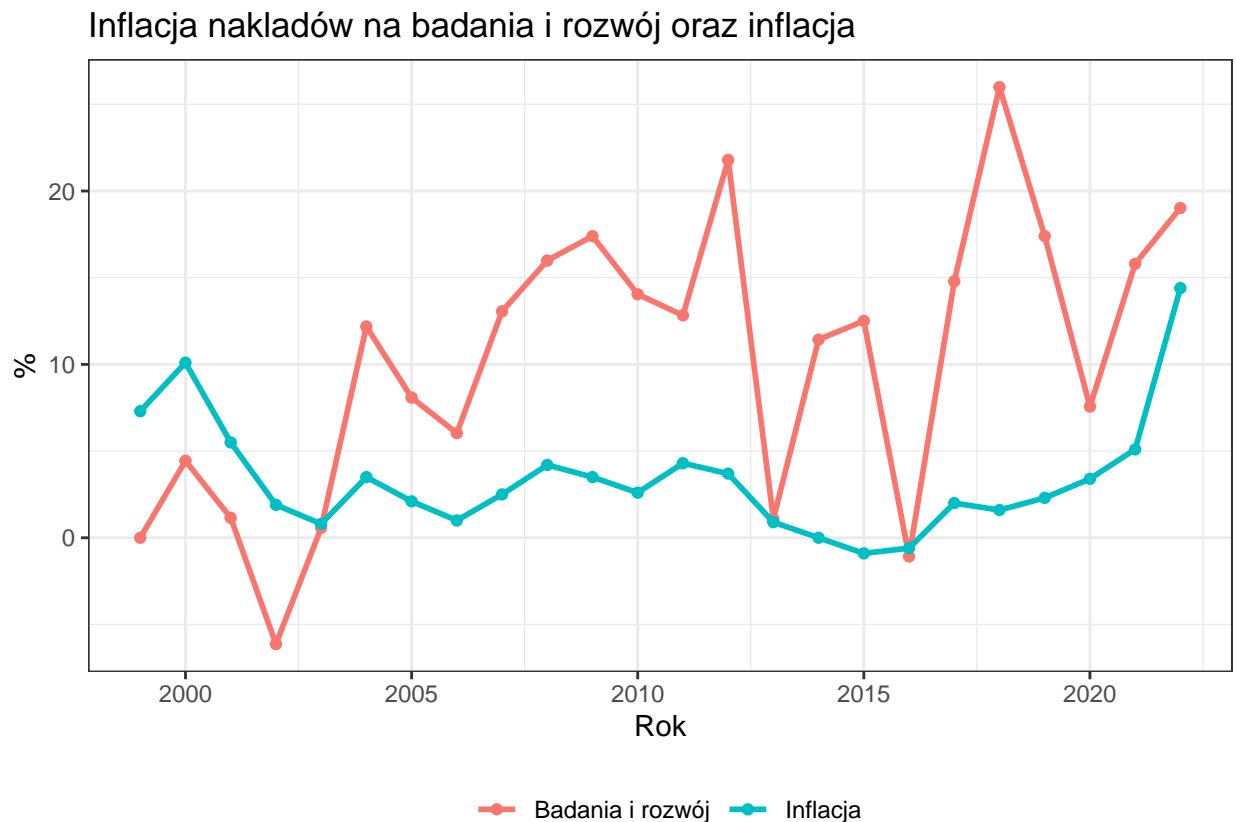
Nałożone na siebie wartości inflacji oraz nakładów na badania i rozwój

```

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
```



```
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$wart_calk, bes = bes$wart_calk)
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) +
```

```

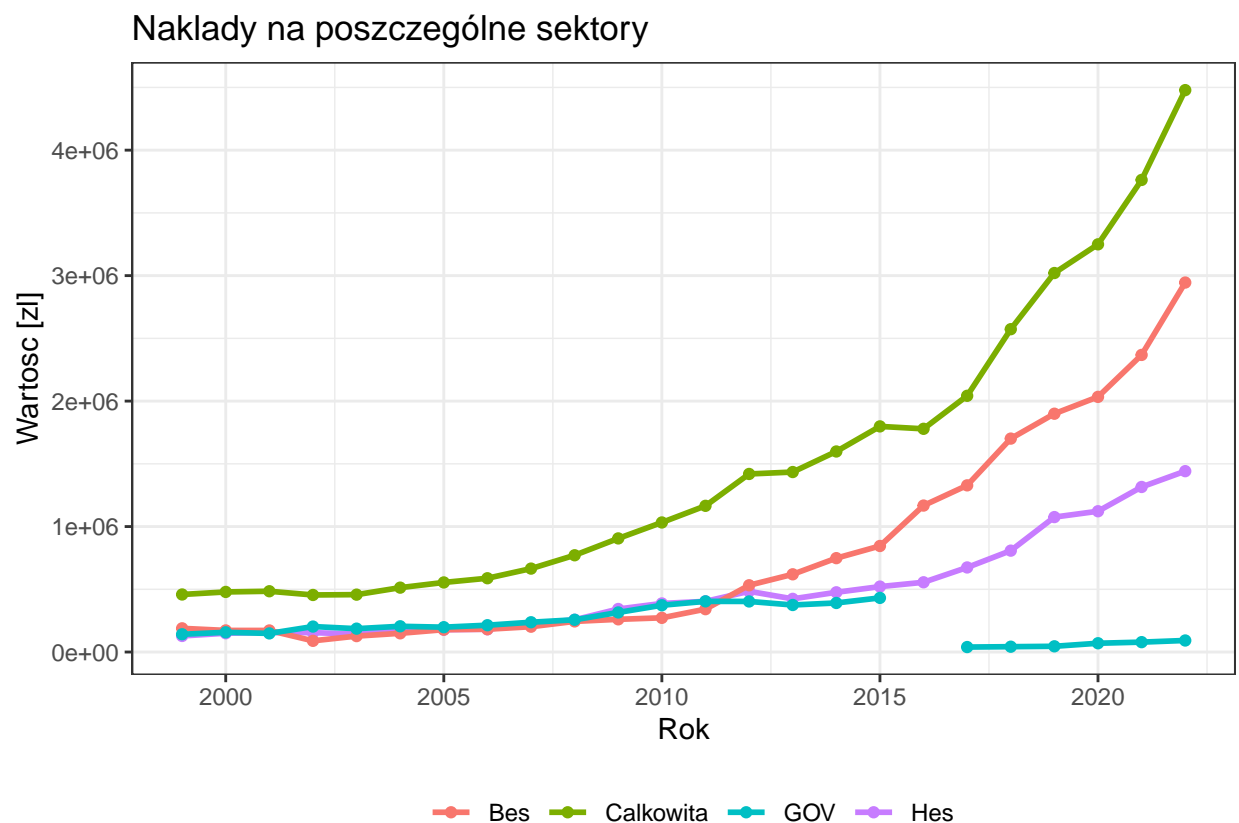
geom_point(aes(y = bes, color = "Bes")) +
geom_line(aes(y = gov, color = "GOV"), size = 1) +
geom_point(aes(y = gov, color = "GOV")) +
geom_line(aes(y = og, color = "Całkowita"), size = 1) +
geom_point(aes(y = og, color = "Całkowita")) +
labs(x = "Rok", y = "Wartość [zł]", color = "") +
ggtitle("Nakłady 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()').

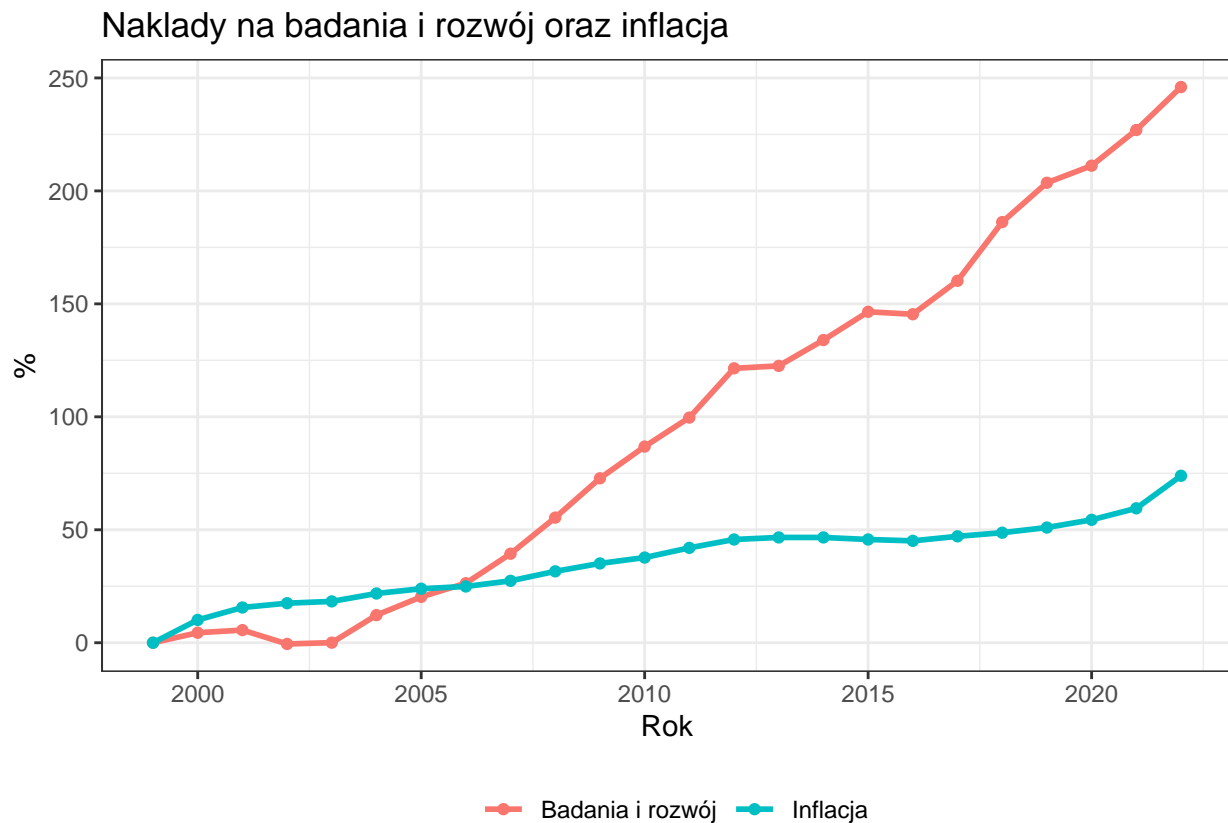
```

Wykres z procentową zmianą ceny

```

plot_data <- tibble(date = modif_inflation$rok, infl_norm = modif_inflation$normal, b_norm = bp$wart_calk)
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

```



Wartość b+r wynikająca z infl

```

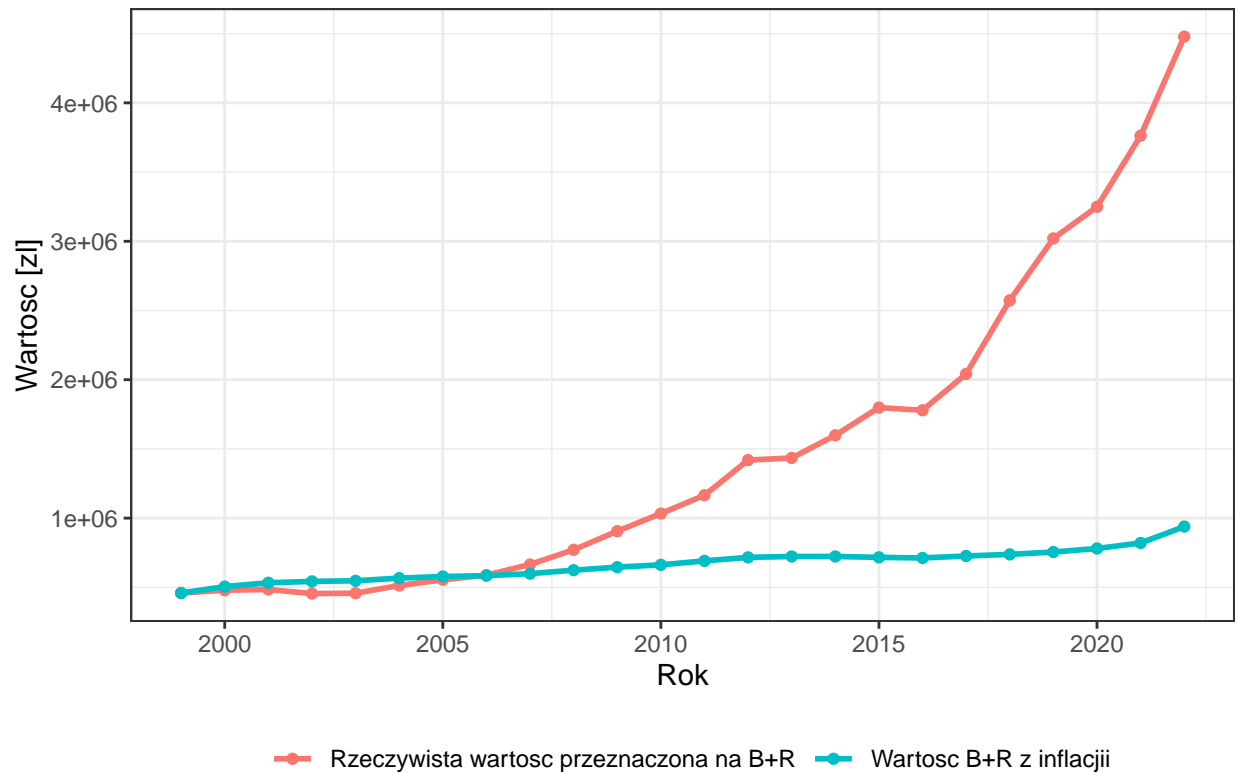
infl_trolley<- numeric(length(modif_inflation$inflation))
infl_trolley[1] = bp$wart_calk[1]
for(i in 2:length(modif_inflation$inflation)){
  infl_trolley[i] = infl_trolley[i-1] + infl_trolley[i-1] * modif_inflation$inflation[i]/100
}

plot_data <- tibble(date = modif_inflation$rok, tr = bp$wart_calk, infl_tr = infl_trolley)
plot <- ggplot(plot_data, aes(date)) +
  geom_line(aes(y = tr, color = "Rzeczywista wartość przeznaczona na B+R"), size = 1) +
  geom_point(aes(y = tr, color = "Rzeczywista wartość przeznaczona na B+R")) +

```

```
geom_line(aes(y = infl_tr, color = "Wartość B+R z inflacji"), size = 1) +
geom_point(aes(y = infl_tr, color = "Wartość B+R z inflacji")) +
labs(x = "Rok", y = "Wartość [zł]", color = "") +
ggtitle("Wartość koszyka wynikająca z inflacji i wartość rzeczywista produkty jedzeniowe") +
theme(legend.position = "bottom")
plot
```

Wartosc koszyka wynikajaca z inflacji i wartosc rzeczywista produkty jed:



```
ggsave("br_i_infl.png")
```

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