

ForGpt

2023-07-10

Question 1 (Moon-Active): In a mobile-app company named “Moon-Active”, there was a scenario in which one of their KPI’s started to behave weirdly after a certain change has been inserted into their mobile-game on the date 15/1/2022. The change was switching commercial material that appeared to the player only from day 4, to appear starting from day 1. The KPI that’s on hand is called “ARPU_R” that is calculated for each day by dividing the ARPU for players that have been playing the game only for a single day (ARPU_1) by the ARPU of the players that played the game for 7 days (ARPU_7). Graph 1.1 depicts the ARPU_R (y-axis) as a function of dates (x-axis) starting from 1/11/2022 until the 01/02/2022 (three months in total). NOTE: In all graphs, the values are for the sake of illustration, the shape and trend of the graph is what matters.

The question are:

- 1.1) Does the trend in graph 1.1 necessarily indicate a problem that the company should be worried about?
- 1.2) Which one of the following graphs (OP1, OP2, OP3) can explain what happened in graph 1.1?
- 1.3) Given the scenario on graph 1.1, should the company perform a roll-back on the change she inserted into the game in 15/1/2022?
- 1.4) How would the graph 1.1 would look like if the graph 1.2 would be changed to the following graph:

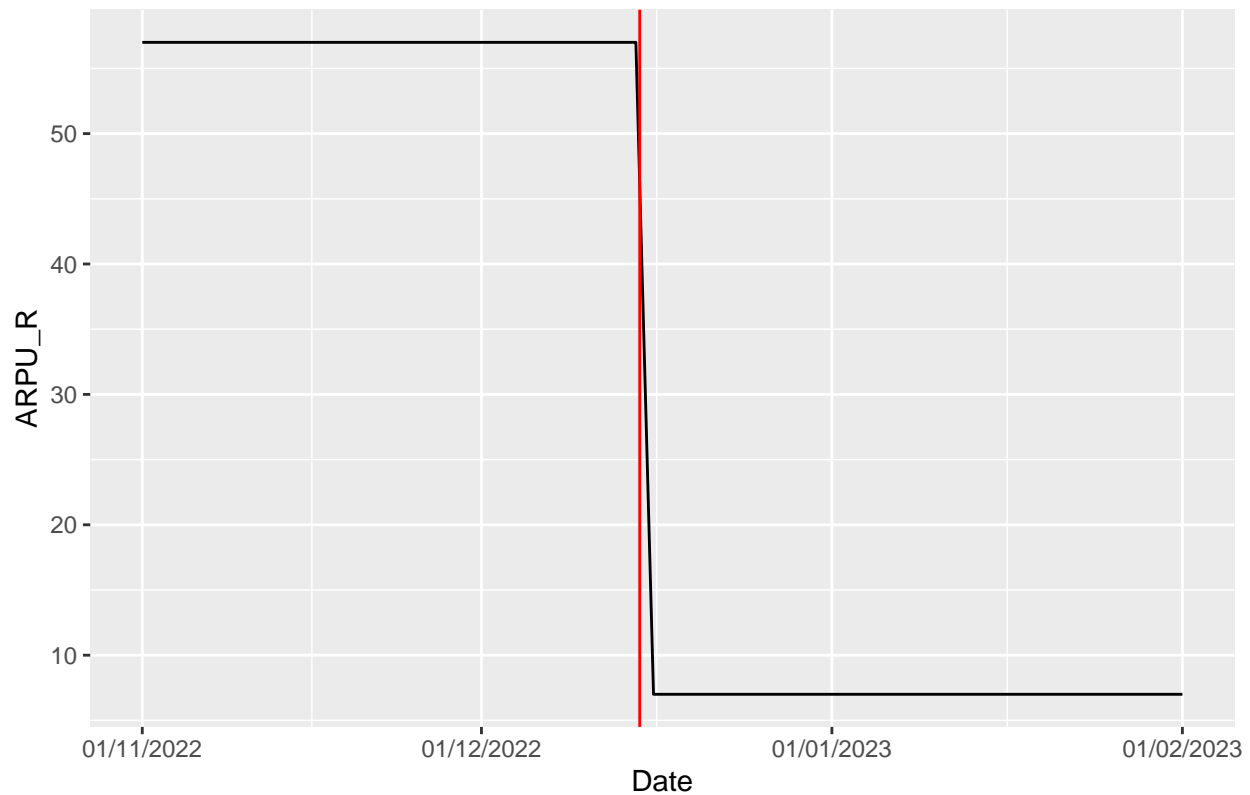
```
# This is the R-code for creating graph 1.1
# Load required libraries
library(ggplot2)
library(scales)
library(ggforce)

sigmoid = function(x) {
  7 +(50 / (1 + exp(50*x))) }

# Create the dataset
dates <- seq(as.Date("2022-11-01"), as.Date("2023-02-01"), length.out = 60)
ARPU_R <- sigmoid(c(-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,
                    -1,-1,-1,-1,-1,-1,-1,-1,-1,-1,
                    -1,-1,-1,-1,-1,-1,-1,-1,-1,-1,50,50,50,50,50,50,50,50,
                    50,50,50,50,50,50,50,50,50,50,50,50,50,50,50,50,50,50,50,50))
df <- data.frame(Date = dates, ARPU_R = ARPU_R)

# Create the graph
ggplot(df, aes(x = Date, y = ARPU_R)) + geom_line() +
  scale_x_date(date_labels = "%d/%m/%Y", date_breaks = "1 month") +
  scale_y_continuous(labels = comma) +
  xlab("Date") +
  ylab("ARPU R") + geom_vline(xintercept= as.Date("2022-12-15"), colour = "red") + ggtitle("Graph 1.1")
```

Graph 1.1



```
# This is the R-code for creating graph 1.2
# Load required libraries
library(ggplot2)
library(scales)
library(ggforce)

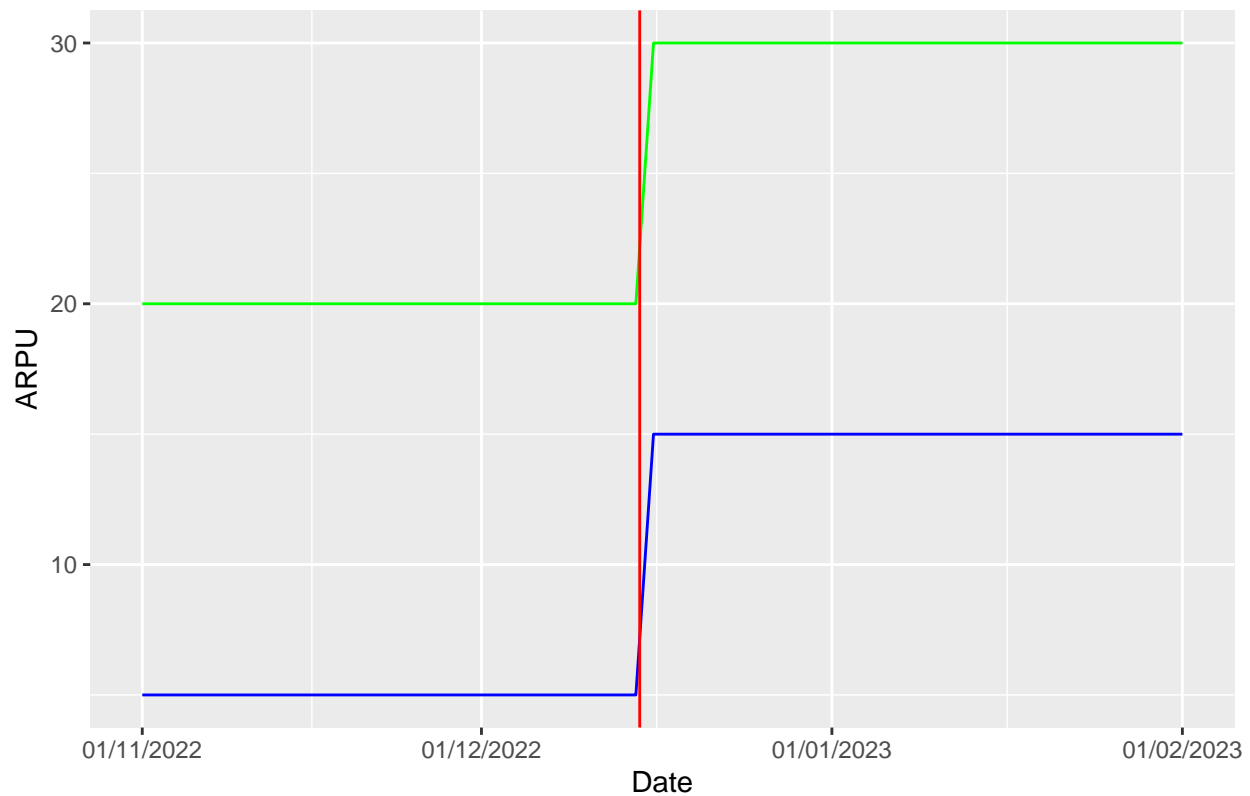
# Create the dataset
dates <- seq(as.Date("2022-11-01"), as.Date("2023-02-01"), length.out = 60)
ARPU_7 <- c(20,20,20,20,20,20,20,20,20,20,20,
            20,20,20,20,20,20,20,20,20,20,20,
            20,20,20,20,20,20,20,20,20,20,30,
            30,30,30,30,30,30,30,30,30,30,30,
            30,30,30,30,30,30,30,30,30,30,30,
            30,30,30,30,30,30,30,30,30,30,30)

ARPU_1 <- c(5,5,5,5,5,5,5,5,5,5,5,
            5,5,5,5,5,5,5,5,5,5,5,
            5,5,5,5,5,5,5,5,5,15,
            15,15,15,15,15,15,15,15,15,15,
            15,15,15,15,15,15,15,15,15,15,
            15,15,15,15,15,15,15,15,15,15)

df <- data.frame(Date = dates, ARPU_1 =ARPU_1, ARPU_7 = ARPU_7)
```

```
# Create the graph
ggplot(df, aes(x = Date, y = ARPU_R)) + geom_line(aes(y=ARPU_7), color = "green") + geom_line(aes(y=ARPU_1), color = "blue") +
  scale_x_date(date_labels = "%d/%m/%Y", date_breaks = "1 month") +
  scale_y_continuous(labels = comma) +
  xlab("Date") +
  ylab("ARPU") + geom_vline(xintercept= as.Date("2022-12-15"), colour = "red") + ggtitle("Graph 1.2")
```

Graph 1.2



```
# This is the R-code for creating graph OP1
# Load required libraries
library(ggplot2)
library(scales)

# Create the dataset
dates <- seq(as.Date("2022-11-01"), as.Date("2023-02-01"), length.out = 60)
ARPU_7 <- c(20,20,20,20,20,20,20,20,20,20,20,
            20,20,20,20,20,20,20,20,20,20,20,
            20,20,20,20,20,20,20,20,20,20,30,
            30,30,30,30,30,30,30,30,30,30,30,
            30,30,30,30,30,30,30,30,30,30,30,
            30,30,30,30,30,30,30,30,30,30)

ARPU_1 <- c(5,5,5,5,5,5,5,5,5,5,5,
            5,5,5,5,5,5,5,5,5,5,5,
```

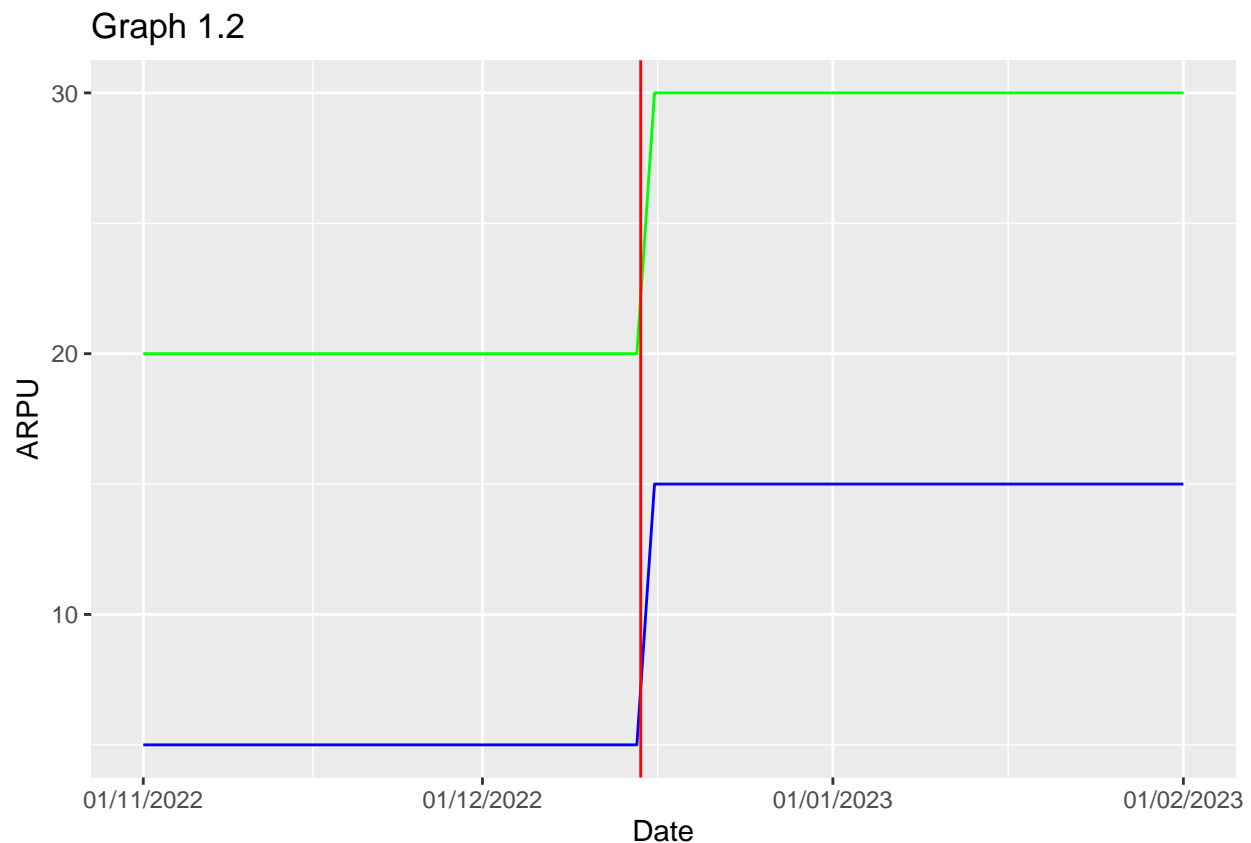
```

5,5,5,5,5,5,5,5,5,15,
15,15,15,15,15,15,15,15,15,15,
15,15,15,15,15,15,15,15,15,15,
15,15,15,15,15,15,15,15,15,15)

df <- data.frame(Date = dates, ARPU_1 =ARPU_1, ARPU_7 = ARPU_7)

# Create the graph
ggplot(df, aes(x = Date, y = ARPU_R)) + geom_line(aes(y=ARPU_7), color = "green") + geom_line(aes(y=ARPU_1), color = "blue") +
  scale_x_date(date_labels = "%d/%m/%Y", date_breaks = "1 month") +
  scale_y_continuous(labels = comma) +
  xlab("Date") +
  ylab("ARPU") + geom_vline(xintercept= as.Date("2022-12-15"), colour = "red") + ggtitle("Graph 1.2")

```



```

# This is the R-code for creating graph OP2
# Load required libraries
library(ggplot2)
library(scales)
library(ggforce)

# Create the dataset
dates <- seq(as.Date("2022-11-01"), as.Date("2023-02-01"), length.out = 60)
ARPU_7 <- c(20,20,20,20,20,20,20,20,20,20,20,

```

```

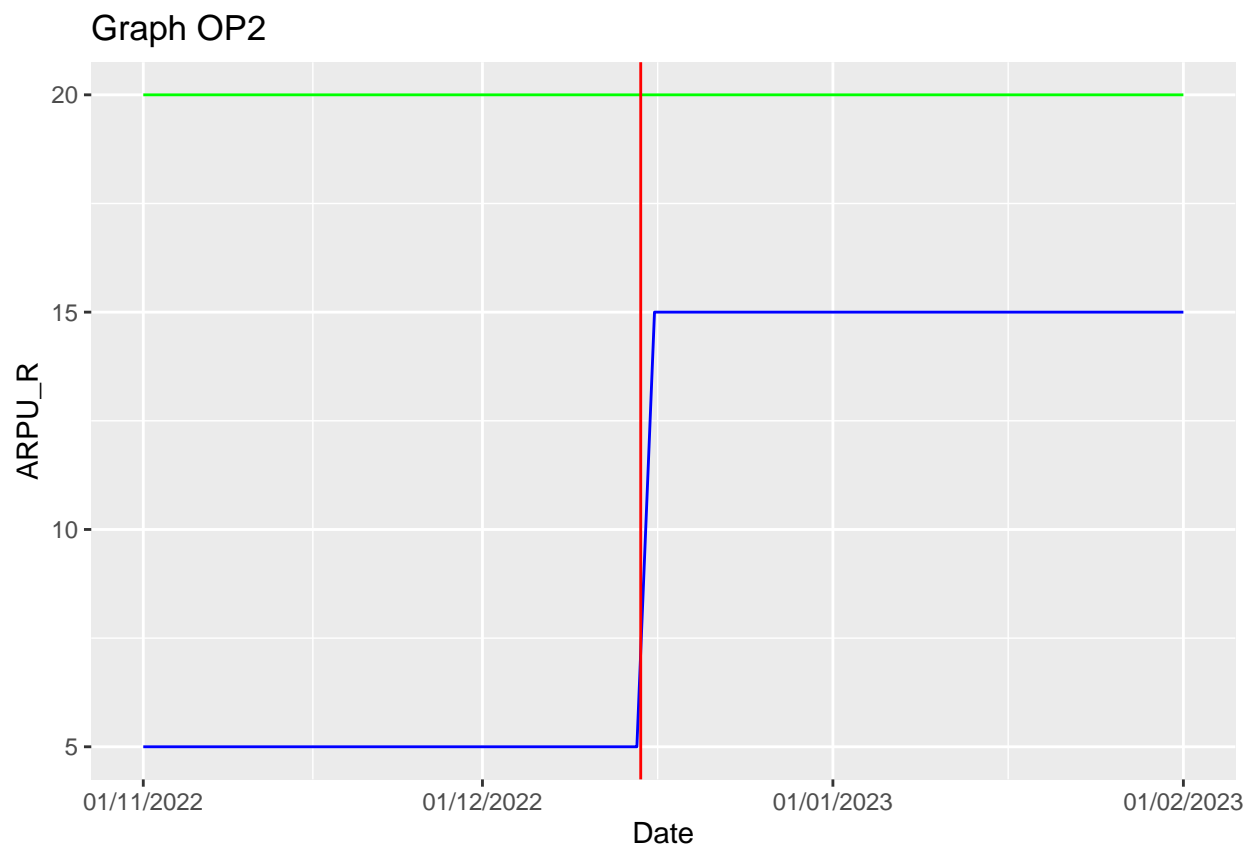
20,20,20,20,20,20,20,20,20,20,20,
20,20,20,20,20,20,20,20,20,20,20,
20,20,20,20,20,20,20,20,20,20,20,
20,20,20,20,20,20,20,20,20,20,20,
20,20,20,20,20,20,20,20,20,20,20)

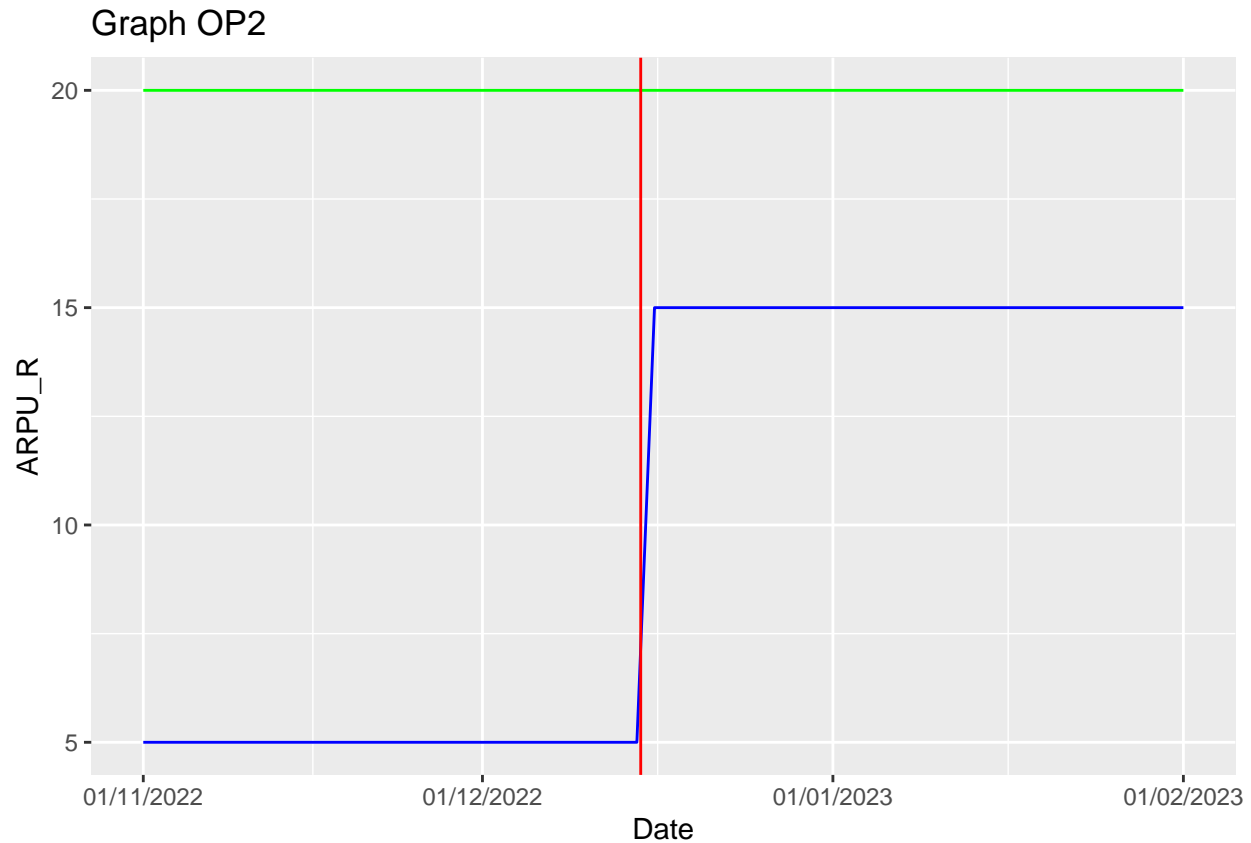
ARPU_1 <- c(5,5,5,5,5,5,5,5,5,5,
5,5,5,5,5,5,5,5,5,5,
5,5,5,5,5,5,5,5,5,15,
15,15,15,15,15,15,15,15,15,15,
15,15,15,15,15,15,15,15,15,15,
15,15,15,15,15,15,15,15,15)

df <- data.frame(Date = dates, ARPU_1 =ARPU_1, ARPU_7 = ARPU_7)

# Create the graph
ggplot(df, aes(x = Date, y = ARPU_R)) + geom_line(aes(y=ARPU_7), color = "green") + geom_line(aes(y=ARPU_1), color = "blue") +
  scale_x_date(date_labels = "%d/%m/%Y", date_breaks = "1 month") +
  scale_y_continuous(labels = comma) +
  xlab("Date") +
  ylab("ARPU_R") + geom_vline(xintercept= as.Date("2022-12-15"), colour = "red") + ggtitle("Graph OP2")

```





```
# This is the R-code for creating graph OP3
# Load required libraries
library(ggplot2)
library(scales)
library(ggforce)

# Create the dataset
dates <- seq(as.Date("2022-11-01"), as.Date("2023-02-01"), length.out = 60)
ARPU_7 <- c(15,15,15,15,15,15,15,15,15,15,
            15,15,15,15,15,15,15,15,15,15,
            15,15,15,15,15,15,15,15,15,5,
            5,5,5,5,5,5,5,5,5,5,
            5,5,5,5,5,5,5,5,5,5,
            5,5,5,5,5,5,5,5,5,5)

ARPU_1 <- c(5,5,5,5,5,5,5,5,5,5,
            5,5,5,5,5,5,5,5,5,5,
            5,5,5,5,5,5,5,5,5,15,
            15,15,15,15,15,15,15,15,15,15,
            15,15,15,15,15,15,15,15,15,15,
            15,15,15,15,15,15,15,15,15)

df <- data.frame(Date = dates, ARPU_1 =ARPU_1, ARPU_7 = ARPU_7)
```

```
# Create the graph
```

```
ggplot(df, aes(x = Date, y = ARPU_R)) + geom_line(aes(y = ARPU_7), color = "green") +  
  geom_line(aes(y = ARPU_1), color = "blue") +  
  scale_x_date(date_labels = "%d/%m/%Y", date_breaks = "1 month") +  
  scale_y_continuous(labels = comma) +  
  xlab("Date") +  
  ylab("ARPU_R") + geom_vline(xintercept = as.Date("2022-12-15"), colour = "red") + ggtitle("Graph OP3")
```

