# STAT 3355 HW1 - Yebom Kim

2024-02-07

## Problem 1

### Problem 1 - (a)

```
num1 <- 8 + 9 - 7 / (3^0.3)
print(round(num1, 2))
```

```
## [1] 11.97
```

### Problem 1 - (b)

```
num2 <- log(sqrt((15 + 16) / (14 + 12)), base = 2)
print(round(num2, 2))
```

```
## [1] 0.13
```

### Problem 1 - (c)

```
num3 <- ((11 + sin(pi / 4)) / (factorial(3) + abs(-10))) ^ 2
print(round(num3, 2))
```

```
## [1] 0.54
```

### Problem 1 - (d)

```
num4 <- 6 + 5 - 4 / 3^2
print(round(num4, 2))
```

```
## [1] 10.56
```

### Problem 1 - (e)

```r
num5 <- exp(sqrt((14 + 13) / (12 + 11)))
print(round(num5, 2))
```

```
## [1] 2.95
```

### Problem 1 - (f)

```r
num6 <- (11 + factorial(12)) / (factorial(13) + 14)^2
print(round(num6, 2))
```

```
## [1] 0
```

### Problem 2

### Problem 2 - (a)

```r
RF <- c(2.60, 3.05, 3.74, 3.48, 5.49, 4.25, 2.57, 2.18, 3.14, 4.82, 3.28, 3.01 )
print(RF)
```

```
##  [1] 2.60 3.05 3.74 3.48 5.49 4.25 2.57 2.18 3.14 4.82 3.28 3.01
```

### Problem 2 - (b)

```r
names(RF) <- c("Jan", "Feb", "Mar", "Apr", "May", "Jul", "Jun", "Aug", "Sep", "Oct", "Nov", "Dec")
print(RF)
```

```
##  Jan  Feb  Mar  Apr  May  Jul  Jun  Aug  Sep  Oct  Nov  Dec
## 2.60 3.05 3.74 3.48 5.49 4.25 2.57 2.18 3.14 4.82 3.28 3.01
```

### Problem 2 - (c)

```r
round((mean(RF)), 2)
```

```
## [1] 3.47
```

### Problem 2 - (d)

```r
min(RF)
```

```
## [1] 2.18
```

```r
max(RF)
```

```
## [1] 5.49
```

## Problem 3

## Problem 3 - (a)

```r
H2 <- c(2700, 2600, 3050, 2900, 3000, 2500, 2600, 3000, 2800, 3200, 2800, 3400)
print(H2)
```

```
##  [1] 2700 2600 3050 2900 3000 2500 2600 3000 2800 3200 2800 3400
```

## Problem 3 - (b)

```r
names(H2) <- c("Jan", "Feb", "Mar", "Apr", "May", "Jul", "Jun", "Aug", "Sep", "Oct", "Nov", "Dec")
print(H2)
```

```
##  Jan  Feb  Mar  Apr  May  Jul  Jun  Aug  Sep  Oct  Nov  Dec
## 2700 2600 3050 2900 3000 2500 2600 3000 2800 3200 2800 3400
```

## Problem 3 - (c)

```r
sum(H2)
```

```
## [1] 34550
```

## Problem 3 - (d)

```r
names(H2)[which.min(diff(H2))]
```

```
## [1] "May"
```

```r
min(diff(H2))
```

```
## [1] -500
```

```r
names(H2)[which.max(diff(H2))]
```

```
## [1] "Nov"
```

```r
max(diff(H2))
```

```
## [1] 600
```

## Problem 4

## Problem 4 - (a)

```r
x <- c(1, -2, 3, -4, 5, 100 )
y <- x * (-1)
y[y > 0]
```

```
## [1] 2 4
```

## Problem 4 - (b)

```r
# create a sequence from 1 to 50
z <- seq(1:50)
# test whether an observation is even
even <- z %% 2 == 0
# subset z by the test above
z = z[even]
```

## Problem 4 - (c)

```r
mean <- function(x) {
  sum(x) / length(x)
}
```

## Problem 5

```r
print_square <- function() {
  final <- NULL
  for (x in 1:1000) {
    if (sqrt(x) %% 1 == 0) {
      final <- c(final, x)
    }
  }
  return(final)
  }
print_square()
```

```
##  [1]   1   4   9  16  25  36  49  64  81 100 121 144 169 196 225 256 289 324 361
## [20] 400 441 484 529 576 625 676 729 784 841 900 961
```

### Problem 6

```r
# Test the number is prime number
is_prime <- function(num) {
  if (num <= 1) {
    return(FALSE)
  }
  if (num == 2) {
    return(TRUE)
  }
  if (any(num %% 2:(num-1) == 0)) {
    return(FALSE)
  }
  return(TRUE)
}

# Function to count the prime num pairs
count_twin_primes <- function(n) {
  count <- 0
  for (i in 3:(n-2)) {
    if (is_prime(i) && is_prime(i + 2)) {
      count <- count + 1
    }
  }
  return(count)
}

n <- 100
result <- count_twin_primes(n)
cat("Number of twin prime pairs:", result)
```

```
## Number of twin prime pairs: 8
```