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Date: October 5, 2025

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Environment reset (run first)

```
rm(list = ls())            # clear objects
graphics.off()             # close plots
cat("\014")                # clear console
```

Step 1: Computing the requested arithmetic and logical expressions

```r
123 * 453
```

```
## [1] 55719
```

```r
5^2 * 40
```

```
## [1] 1000
```

```r
TRUE & FALSE
```

```
## [1] FALSE
```

```r
TRUE | FALSE
```

```
## [1] TRUE
```

```r
75 %% 10
```

```
## [1] 5
```

```r
75 / 10
```

```
## [1] 7.5
```

Step 2: Creating a vector with c() function and storing it in variable "first_vector"

```r
first_vector <- c(17, 12, -33, 5)
first_vector
```

```
## [1]  17  12 -33   5
```

Step 3: Creating a 5-multiples vector with c() function and storing it in variable "counting_by_fives"

```r
counting_by_fives <- c(5, 10, 15, 20, 25, 30, 35)
counting_by_fives
```

```
## [1]  5 10 15 20 25 30 35
```

Step 4: Creating a descending vector from 20 to 1 using range operator “:” and storing it in “second_vector”

```
second_vector <- 20:1
second_vector
```

```
##  [1] 20 19 18 17 16 15 14 13 12 11 10  9  8  7  6  5  4  3  2  1
```

Step 5: Creating a vector from 5 to 15 using range operator “:” and storing it in “counting_vector”

```
counting_vector <- 5:15
counting_vector
```

```
##  [1]  5  6  7  8  9 10 11 12 13 14 15
```

Step 6: Creating a vector of grades and storing it in “grades”

```
grades <- c(96, 100, 85, 92, 81, 72)
grades
```

```
## [1]  96 100  85  92  81  72
```

Step 7: Adding 3 bonus points to grades and storing it in “bonus_points_added”

```
bonus_points_added <- grades + 3
bonus_points_added
```

```
## [1]  99 103  88  95  84  75
```

Step 8: Creating a vector of numbers 1–100 using range operator “:” and storing it in “one_to_one_hundred”

```
one_to_one_hundred <- 1:100
one_to_one_hundred
```

```
##   [1]   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19  20  21  22  23  24
##  [40]  40  41  42  43  44  45  46  47  48  49  50  51  52  53  54  55  56  57  58  59  60  61  62  63
##  [79]  79  80  81  82  83  84  85  86  87  88  89  90  91  92  93  94  95  96  97  98  99 100
```

Step 9: Performing addition, multiplication, and logical comparisons on "second_vector"

```r
#'Reading "second_vector"
second_vector
```

```
##  [1] 20 19 18 17 16 15 14 13 12 11 10  9  8  7  6  5  4  3  2  1
```

```r
#'Adding 20 to "second_vector" elements
second_vector + 20
```

```
##  [1] 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21
```

```r
#'Reading "second_vector"
second_vector
```

```
##  [1] 20 19 18 17 16 15 14 13 12 11 10  9  8  7  6  5  4  3  2  1
```

```r
#'Multiplying 20 to "second_vector" elements
second_vector * 20
```

```
##  [1] 400 380 360 340 320 300 280 260 240 220 200 180 160 140 120 100  80  60  40  20
```

```r
#'Reading "second_vector"
second_vector
```

```
##  [1] 20 19 18 17 16 15 14 13 12 11 10  9  8  7  6  5  4  3  2  1
```

```r
#'Checking if "second_vector" elements are greater or equal than 20
second_vector >= 20
```

```
##  [1]  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
```

```r
#'Reading "second_vector"
second_vector
```

```
##  [1] 20 19 18 17 16 15 14 13 12 11 10  9  8  7  6  5  4  3  2  1
```

```r
#'Checking if "second_vector" elements are not equal to 20
second_vector != 20
```

```
##  [1] FALSE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE
```

```r
#'Reading "second_vector"
second_vector
```

```
##  [1] 20 19 18 17 16 15 14 13 12 11 10  9  8  7  6  5  4  3  2  1
```

Since we are only computing arithmetic and logical expressions and not updating the "second_vector", its value remains unchanged

Step 10: Calculating sum of numbers from 1–100 and storing it in "total"

```
total <- sum(one_to_one_hundred)
total
```

```
## [1] 5050
```

Step 11: Calculating average of numbers from 1–100 and storing it in "average_value"

```
average_value <- mean(one_to_one_hundred)
average_value
```

```
## [1] 50.5
```

Step 12: Calculating median of numbers from 1–100 and storing it in "median_value"

```
median_value <- median(one_to_one_hundred)
median_value
```

```
## [1] 50.5
```

Step 13: Finding maximum value from 1–100 and storing it in "max_value"

```
max_value <- max(one_to_one_hundred)
max_value
```

```
## [1] 100
```

Step 14: Finding minimum value from 1–100 and storing it in "min_value"

```
min_value <- min(one_to_one_hundred)
min_value
```

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

Step 15: Extracting first element from "second_vector" and storing it in "first_value"

```
first_value <- second_vector[1]
first_value
```

```
## [1] 20
```

Step 16: Extracting first three elements from "second_vector" and storing them in "first_three_values"

```
first_three_values <- second_vector[1:3]
first_three_values
```

```
## [1] 20 19 18
```

Step 17: Extracting 1st, 5th, 10th, and 11th elements from "second_vector" and storing in "vector_from_brackets"

```
vector_from_brackets <- second_vector[c(1, 5, 10, 11)]
vector_from_brackets
```

```
## [1] 20 16 11 10
```

Step 18: Using Boolean indexing to extract selected elements from "first_vector" and storing in "vector_from_boolean_brackets"

```
vector_from_boolean_brackets <- first_vector[c(FALSE, TRUE, FALSE, TRUE)]
vector_from_boolean_brackets
```

```
## [1] 12  5
```

Only elements where the index is True is filtered and stored in new variable "vector_from_boolean_brackets"

Step 19: Checking which elements in "second_vector" are greater than or equal to 10

```r
second_vector >= 10
```

```
##  [1]  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE FALSE FALSE FALSE FALSE FALSE
```

```r
second_vector
```

```
##  [1] 20 19 18 17 16 15 14 13 12 11 10  9  8  7  6  5  4  3  2  1
```

First 10 elements of the "second_vector" are greater or equal to 10, meanwhile the "second_vector" is unchanged

Step 20: Filtering "one_to_one_hundred" to keep only values >= 20

```r
one_to_one_hundred[one_to_one_hundred >= 20]
```

```
##  [1]  20  21  22  23  24  25  26  27  28  29  30  31  32  33  34  35  36  37  38  39  40  41  42  43
## [41]  60  61  62  63  64  65  66  67  68  69  70  71  72  73  74  75  76  77  78  79  80  81  82  83
## [81] 100
```

```r
one_to_one_hundred
```

```
##   [1]   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19  20  21  22  23  24
##  [40]  40  41  42  43  44  45  46  47  48  49  50  51  52  53  54  55  56  57  58  59  60  61  62  63
##  [79]  79  80  81  82  83  84  85  86  87  88  89  90  91  92  93  94  95  96  97  98  99 100
```

Only 81 elements are selected only for viewing (and not updated) out of 100, with filter condition of "one_to_one_hundred" elements greater or equal to 20.

Step 21: Filtering "grades" to keep only values greater than 85 and storing in "lowest_grades_removed"

```r
lowest_grades_removed <- grades[grades > 85]
lowest_grades_removed
```

```
## [1]  96 100  92
```

Step 22: Removing 3rd and 4th elements from "grades" and storing in "middle_grades_removed"

```
middle_grades_removed <- grades[-c(3, 4)]
middle_grades_removed
```

```
## [1]  96 100  81  72
```

Step 23: Removing 5th and 10th elements from "second_vector" and storing in "fifth_vector"

```
fifth_vector <- second_vector[-c(5, 10)]
fifth_vector
```

```
##  [1] 20 19 18 17 15 14 13 12 10  9  8  7  6  5  4  3  2  1
```

Step 24: Setting seed and generating 10 random numbers between 0 and 1000 using runif(), storing in "random_vector"

```
set.seed(5)
random_vector <- runif(n = 10, min = 0, max = 1000)
random_vector
```

```
##  [1] 200.2145 685.2186 916.8758 284.3995 104.6501 701.0575 527.9600 807.9352 956.5001 110.4530
```

Step 25: Calculating total of "random_vector" and storing in "sum_vector"

```
sum_vector <- sum(random_vector)
sum_vector
```

```
## [1] 5295.264
```

Step 26: Calculating cumulative sum of "random_vector" and storing in "cumsum_vector"

```r
cumsum_vector <- cumsum(random_vector)
cumsum_vector
```

```
##  [1]  200.2145  885.4330 1802.3088 2086.7083 2191.3584 2892.4159 3420.3759 4228.3111 5184.8112 5295.
```

Step 27: Calculating mean of "random_vector" and storing in "mean_vector"

```r
mean_vector <- mean(random_vector)
mean_vector
```

```
## [1] 529.5264
```

Step 28: Calculating standard deviation of "random_vector" and storing in "sd_vector"

```r
sd_vector <- sd(random_vector)
sd_vector
```

```
## [1] 331.3606
```

Step 29: Rounding values of "random_vector" to nearest integers and storing in "round_vector"

```r
round_vector <- round(random_vector)
round_vector
```

```
##  [1] 200 685 917 284 105 701 528 808 957 110
```

Step 30: Sorting values of "random_vector" in ascending order and storing in "sort_vector"

```r
sort_vector <- sort(random_vector)
sort_vector
```

```
##  [1] 104.6501 110.4530 200.2145 284.3995 527.9600 685.2186 701.0575 807.9352 916.8758 956.5001
```

Step 31: Downloading the datafile ds_salaries.csv from Canvas and Saving it in same directory as this project

Step 32: Reading dataset "ds_salaries.csv" into R and storing it as "first_dataframe"

```
first_dataframe <- read.csv("ds_salaries.csv")
first_dataframe
```

```
##     X work_year experience_level employment_type                                   job_title   salary sa
## 1   0      2020               MI              FT                              Data Scientist    70000
## 2   1      2020               SE              FT                  Machine Learning Scientist   260000
## 3   2      2020               SE              FT                           Big Data Engineer    85000
## 4   3      2020               MI              FT                        Product Data Analyst    20000
## 5   4      2020               SE              FT                   Machine Learning Engineer   150000
## 6   5      2020               EN              FT                                Data Analyst    72000
## 7   6      2020               SE              FT                         Lead Data Scientist   190000
## 8   7      2020               MI              FT                              Data Scientist 11000000
## 9   8      2020               MI              FT                       Business Data Analyst   135000
## 10  9      2020               SE              FT                          Lead Data Engineer   125000
## 11 10      2020               EN              FT                              Data Scientist    45000
## 12 11      2020               MI              FT                              Data Scientist  3000000
## 13 12      2020               EN              FT                              Data Scientist    35000
## 14 13      2020               MI              FT                           Lead Data Analyst    87000
## 15 14      2020               MI              FT                                Data Analyst    85000
## 16 15      2020               MI              FT                                Data Analyst     8000
## 17 16      2020               EN              FT                               Data Engineer  4450000
## 18 17      2020               SE              FT                           Big Data Engineer   100000
## 19 18      2020               EN              FT                     Data Science Consultant   423000
## 20 19      2020               MI              FT                          Lead Data Engineer    56000
## 21 20      2020               MI              FT                   Machine Learning Engineer   299000
## 22 21      2020               MI              FT                        Product Data Analyst   450000
## 23 22      2020               SE              FT                               Data Engineer    42000
## 24 23      2020               MI              FT                             BI Data Analyst    98000
## 25 24      2020               MI              FT                         Lead Data Scientist   115000
## 26 25      2020               EX              FT                    Director of Data Science   325000
## 27 26      2020               EN              FT                          Research Scientist    42000
## 28 27      2020               SE              FT                               Data Engineer   720000
## 29 28      2020               EN              CT                       Business Data Analyst   100000
## 30 29      2020               SE              FT                    Machine Learning Manager   157000
## 31 30      2020               MI              FT                    Data Engineering Manager    51999
## 32 31      2020               EN              FT                           Big Data Engineer    70000
## 33 32      2020               SE              FT                              Data Scientist    60000
## 34 33      2020               MI              FT                          Research Scientist   450000
## 35 34      2020               MI              FT                                Data Analyst    41000
## 36 35      2020               MI              FT                               Data Engineer    65000
## 37 36      2020               MI              FT                     Data Science Consultant   103000
## 38 37      2020               EN              FT                   Machine Learning Engineer   250000
## 39 38      2020               EN              FT                                Data Analyst    10000
## 40 39      2020               EN              FT                   Machine Learning Engineer   138000
## 41 40      2020               MI              FT                              Data Scientist    45760
```

```
## 42 41      2020               EX               FT                   Data Engineering Manager    70000
## 43 42      2020               MI               FT Machine Learning Infrastructure Engineer    44000
## 44 43      2020               MI               FT                              Data Engineer   106000
## 45 44      2020               MI               FT                              Data Engineer    88000
## 46 45      2020               EN               PT                                ML Engineer    14000
## 47 46      2020               MI               FT                             Data Scientist    60000
## 48 47      2020               SE               FT                              Data Engineer   188000
## 49 48      2020               MI               FT                             Data Scientist   105000
## 50 49      2020               MI               FT                              Data Engineer    61500
## 51 50      2020               EN               FT                               Data Analyst   450000
## 52 51      2020               EN               FT                               Data Analyst    91000
## 53 52      2020               EN               FT                               AI Scientist   300000
## 54 53      2020               EN               FT                              Data Engineer    48000
## 55 54      2020               SE               FL                   Computer Vision Engineer    60000
## 56 55      2020               SE               FT                   Principal Data Scientist   130000
## 57 56      2020               MI               FT                             Data Scientist    34000
## 58 57      2020               MI               FT                             Data Scientist   118000
## 59 58      2020               SE               FT                             Data Scientist   120000
## 60 59      2020               MI               FT                             Data Scientist   138350
## 61 60      2020               MI               FT                              Data Engineer   110000
## 62 61      2020               MI               FT                              Data Engineer   130800
## 63 62      2020               EN               PT                             Data Scientist    19000
## 64 63      2020               SE               FT                             Data Scientist   412000
## 65 64      2020               SE               FT                  Machine Learning Engineer    40000
## 66 65      2020               EN               FT                             Data Scientist    55000
## 67 66      2020               EN               FT                             Data Scientist    43200
## 68 67      2020               SE               FT                       Data Science Manager   190200
## 69 68      2020               EN               FT                             Data Scientist   105000
## 70 69      2020               SE               FT                             Data Scientist    80000
## 71 70      2020               MI               FT                             Data Scientist    55000
## 72 71      2020               MI               FT                             Data Scientist    37000
## 73 72      2021               EN               FT                         Research Scientist    60000
## 74 73      2021               EX               FT                            BI Data Analyst   150000
## 75 74      2021               EX               FT                               Head of Data   235000
## 76 75      2021               SE               FT                             Data Scientist    45000
## 77 76      2021               MI               FT                            BI Data Analyst   100000
## 78 77      2021               MI               PT              3D Computer Vision Researcher   400000
## 79 78      2021               MI               CT                                ML Engineer   270000
## 80 79      2021               EN               FT                               Data Analyst    80000
## 81 80      2021               SE               FT                    Data Analytics Engineer    67000
## 82 81      2021               MI               FT                              Data Engineer   140000
## 83 82      2021               MI               FT                     Applied Data Scientist    68000
##    company_location company_size
## 1                DE            L
## 2                JP            S
## 3                GB            M
## 4                HN            S
## 5                US            L
## 6                US            L
## 7                US            S
## 8                HU            L
## 9                US            L
## 10               NZ            S
## 11               FR            S
```

```
## 12                  IN            L
## 13                  FR            M
## 14                  US            L
## 15                  US            L
## 16                  PK            L
## 17                  JP            S
## 18                  GB            S
## 19                  IN            M
## 20                  US            M
## 21                  CN            M
## 22                  IN            L
## 23                  GR            L
## 24                  US            M
## 25                  AE            L
## 26                  US            L
## 27                  NL            L
## 28                  MX            S
## 29                  US            L
## 30                  CA            L
## 31                  DE            S
## 32                  US            L
## 33                  US            L
## 34                  US            M
## 35                  FR            L
## 36                  AT            L
## 37                  US            L
## 38                  US            L
## 39                  NG            S
## 40                  US            S
## 41                  US            S
## 42                  ES            L
## 43                  PT            M
## 44                  US            L
## 45                  GB            L
## 46                  DE            S
## 47                  GB            S
## 48                  US            L
## 49                  US            L
## 50                  FR            L
## 51                  IN            S
## 52                  US            L
## 53                  DK            S
## 54                  DE            L
## 55                  US            S
## 56                  DE            M
## 57                  ES            M
## 58                  US            M
## 59                  US            L
## 60                  US            M
## 61                  US            L
## 62                  US            M
## 63                  IT            S
## 64                  US            L
## 65                  HR            S
```

```
## 66              DE           S
## 67              DE           S
## 68              US           M
## 69              US           S
## 70              AT           S
## 71              LU           S
## 72              FR           S
## 73              GB           L
## 74              US           L
## 75              US           L
## 76              FR           L
## 77              US           M
## 78              IN           M
## 79              US           L
## 80              US           M
## 81              DE           L
## 82              US           L
## 83              CA           L
##  [ reached 'max' / getOption("max.print") -- omitted 524 rows ]
```

Step 33: Generating summary statistics of the dataset "first_dataframe"

```r
summary(first_dataframe)
```

```
##        X           work_year    experience_level   employment_type     job_title           salary
##  Min.   :  0.0   Min.   :2020   Length:607         Length:607         Length:607         Min.   :
##  1st Qu.:151.5   1st Qu.:2021   Class :character   Class :character   Class :character   1st Qu.:
##  Median :303.0   Median :2022   Mode  :character   Mode  :character   Mode  :character   Median :  1
##  Mean   :303.0   Mean   :2021                                                            Mean   :  3
##  3rd Qu.:454.5   3rd Qu.:2022                                                            3rd Qu.:  1
##  Max.   :606.0   Max.   :2022                                                            Max.   :304
##   remote_ratio    company_location   company_size
##  Min.   :  0.00   Length:607         Length:607
##  1st Qu.: 50.00   Class :character   Class :character
##  Median :100.00   Mode  :character   Mode  :character
##  Mean   : 70.92
##  3rd Qu.:100.00
##  Max.   :100.00
```

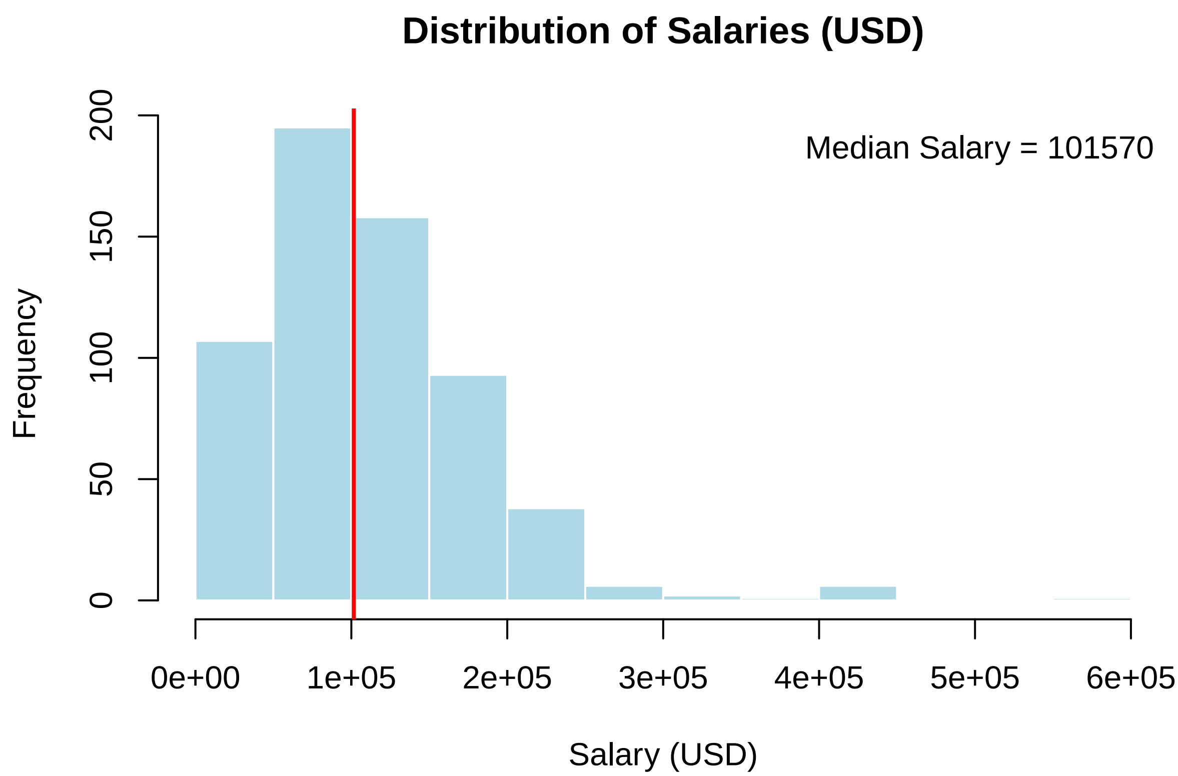
Visualizations + Recommendations

1. Salary Distribution (Histogram)

Reason: Helps visualize how salaries are spread, showing skewness and outliers.

```r
hist(first_dataframe$salary_in_usd,
     main = "Distribution of Salaries (USD)",
     xlab = "Salary (USD)",
```

```
     col = "lightblue",
     border = "white")
abline(v = median(first_dataframe$salary_in_usd, na.rm = TRUE),
       col = "red", lwd = 2)
legend("topright", legend = c(paste("Median Salary =", round(median(first_dataframe$salary_in_usd, na.rm
       bty = "n")
```



2. Salary by Experience Level (Boxplot)

Reason: Shows how pay changes with experience, revealing career-level pay gaps.

```
boxplot(salary_in_usd ~ experience_level, data = first_dataframe,
        main = "Salary by Experience Level",
        xlab = "Experience Level",
        ylab = "Salary (USD)",
        col = "lightgreen")
```

3. Salary by Company Size (Boxplot)

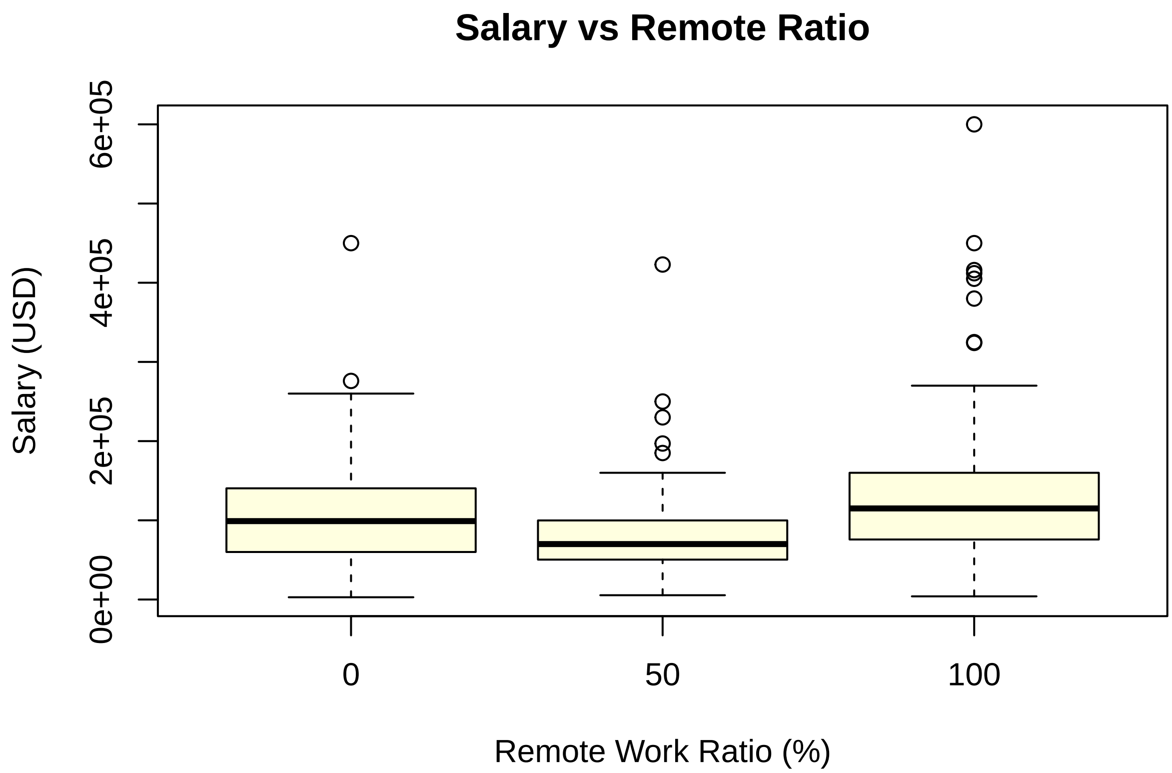
Reason: Highlights differences in pay trends across small, medium, and large companies.

```r
boxplot(salary_in_usd ~ company_size, data = first_dataframe,
        main = "Salary by Company Size",
        xlab = "Company Size",
        ylab = "Salary (USD)",
        col = "lightpink")
```

4. Remote Ratio vs Salary (Boxplot)

Reason: Shows how compensation differs between on-site, hybrid, and fully remote roles.

```
boxplot(salary_in_usd ~ remote_ratio, data = first_dataframe,
        main = "Salary vs Remote Ratio",
        xlab = "Remote Work Ratio (%)",
        ylab = "Salary (USD)",
        col = "lightyellow")
```



Findings & Insights

The visualizations show that salaries in the dataset are right-skewed, with most professionals earning around the median while a few high-paying roles drive up the average. Pay clearly increases with experience, moving from entry- to executive-level positions. Larger companies tend to offer higher compensation than small or mid-sized ones, reflecting resource differences. Finally, remote roles show comparable or slightly higher pay, suggesting flexibility is increasingly valued without reducing earnings potential.

References

R Core Team (2025). *R: A Language and Environment for Statistical Computing.*
Xie, Y. (2023). *knitr: A General-Purpose Package for Dynamic Report Generation in R.*
All code written by the author for Yadav_Project1.

END