2448030\_MDS272\_Lab3.R

Kevin

2024-10-16

##QUESTION1 Store the following data sets into a variable any way you can:  
##a)1, 2, 3, 5, 8, 13, 21, 34 (the Fibonacci series)  
FIBONACCI=c(1,2,3,8,13,21,34);FIBONACCI

## [1] 1 2 3 8 13 21 34

##b)1, 2, 3, 4, 5, 6, 7, 8, 9, 10 (positive integers)  
number=c(1:10);number

## [1] 1 2 3 4 5 6 7 8 9 10

##c)1/1, 1/2, 1/3, 1/4, 1/5, 1/6, 1/7, 1/8, 1/9, 1/10 (reciprocals)  
reciprocal=(1:10);reciprocal

## [1] 1 2 3 4 5 6 7 8 9 10

##d)1964, 1965, ..., 2003 (some years)  
years=1964:2003;years

## [1] 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978  
## [16] 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993  
## [31] 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003

##e)0, 25, 50, 75, 100, ..., 975, 1000 (0 to 1000 by 25s)  
n=seq(0,1000,by=25);n

## [1] 0 25 50 75 100 125 150 175 200 225 250 275 300 325 350  
## [16] 375 400 425 450 475 500 525 550 575 600 625 650 675 700 725  
## [31] 750 775 800 825 850 875 900 925 950 975 1000

##QUESTION2:  
##a)Create a numeric vector containing the numbers 10 to 200.  
numeric\_vector=c(10:200);numeric\_vector

## [1] 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27  
## [19] 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45  
## [37] 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63  
## [55] 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81  
## [73] 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99  
## [91] 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117  
## [109] 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135  
## [127] 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153  
## [145] 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171  
## [163] 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189  
## [181] 190 191 192 193 194 195 196 197 198 199 200

##b)Create a character vector with your name and four of your friends.  
name\_vector=c("melvin","renuka","vaibhav","jathin");name\_vector

## [1] "melvin" "renuka" "vaibhav" "jathin"

##c)Create a logical vector with alternating TRUE and FALSE values for a length of 10.  
logical\_vector=rep(c(TRUE,FALSE),times=5);logical\_vector

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

##QUESTION3  
##a)Create a 3x3 matrix with the numbers 1 to 9 and assign it to ‘M’.  
Mat=matrix(1:9,nrow=3,ncol=3);Mat

## [,1] [,2] [,3]  
## [1,] 1 4 7  
## [2,] 2 5 8  
## [3,] 3 6 9

##b)Access the element at the 2nd row and 3rd column  
M=Mat[2:3];M

## [1] 2 3

#c)Create a 3x3 matrix with the numbers 6, 6, 8, 2, 19, 1, 0, 11, 12 and assign it to ‘P’.  
P = matrix(c(6, 6, 8, 2, 19, 1, 0, 11, 12), nrow = 3, ncol = 3);P

## [,1] [,2] [,3]  
## [1,] 6 2 0  
## [2,] 6 19 11  
## [3,] 8 1 12

#d) Find A+B, A-B, A x B determinant of A and B, Transpose of A and B, inverse of A and B,trace of A and B.  
A = matrix(3:11, nrow=3, ncol = 3);A

## [,1] [,2] [,3]  
## [1,] 3 6 9  
## [2,] 4 7 10  
## [3,] 5 8 11

B = matrix(5:13, nrow = 3, ncol = 3);B

## [,1] [,2] [,3]  
## [1,] 5 8 11  
## [2,] 6 9 12  
## [3,] 7 10 13

#A+B  
mat\_add = A+B;mat\_add

## [,1] [,2] [,3]  
## [1,] 8 14 20  
## [2,] 10 16 22  
## [3,] 12 18 24

#A-B  
mat\_sub = A-B;mat\_sub

## [,1] [,2] [,3]  
## [1,] -2 -2 -2  
## [2,] -2 -2 -2  
## [3,] -2 -2 -2

#A\*B  
mat\_mult = A%\*%B;mat\_mult

## [,1] [,2] [,3]  
## [1,] 114 168 222  
## [2,] 132 195 258  
## [3,] 150 222 294

#determinant  
det\_A = det(A);det\_A

## [1] 0

det\_B = det(B);det\_B

## [1] 0

#transpose  
trans\_A = t(A);trans\_A

## [,1] [,2] [,3]  
## [1,] 3 4 5  
## [2,] 6 7 8  
## [3,] 9 10 11

trans\_B = t(B);trans\_B

## [,1] [,2] [,3]  
## [1,] 5 6 7  
## [2,] 8 9 10  
## [3,] 11 12 13

#inverse  
#inv\_A = solve(A);inv\_A  
#inv\_B = solve(B);inv\_B  
  
#trace  
trace\_A = sum(diag(A));trace\_A

## [1] 21

trace\_B = sum(diag(B));trace\_B

## [1] 27

##QUESTION4  
#a) Create a list with the following components: a character string MDS and a numeric value as your current trimester, and a logical value TRUE.  
li = list(course = "MDS", trimester = 2, flag = TRUE);li

## $course  
## [1] "MDS"  
##   
## $trimester  
## [1] 2  
##   
## $flag  
## [1] TRUE

#b) Access your trimester from the list.  
my\_trimester = li$trimester;my\_trimester

## [1] 2

##QUESTION5  
#a) Create a data frame with the 10 entries having SNo., name, registration number, date of birth,age, hometown.  
students = data.frame(  
 SNo = 1:10,  
 name = c("Kevin", "Elvis", "Aryan", "Shradha", "Sona", "Emiya", "Joan", "Aanchal", "Akshay", "Mohit"),  
 reg\_no = c("REG1", "REG2", "REG3", "REG4", "REG5", "REG6", "REG7", "REG8", "REG9", "REG10"),  
 dob = as.Date(c("2000-01-15", "1999-05-23", "2001-11-05", "1998-02-10", "2000-06-08",   
 "1997-12-19", "2001-03-30", "1999-08-14", "2002-07-22", "1998-10-01")),  
 age = c(24, 25, 23, 26, 24, 27, 23, 25, 22, 26),  
 hometown = c("Mumbai", "Kolkata", "Wasseypur", "Gurgaon", "Delhi", "Bengaluru", "Chennai", "Hyderabad", "Cochin", "Goa")  
);students

## SNo name reg\_no dob age hometown  
## 1 1 Kevin REG1 2000-01-15 24 Mumbai  
## 2 2 Elvis REG2 1999-05-23 25 Kolkata  
## 3 3 Aryan REG3 2001-11-05 23 Wasseypur  
## 4 4 Shradha REG4 1998-02-10 26 Gurgaon  
## 5 5 Sona REG5 2000-06-08 24 Delhi  
## 6 6 Emiya REG6 1997-12-19 27 Bengaluru  
## 7 7 Joan REG7 2001-03-30 23 Chennai  
## 8 8 Aanchal REG8 1999-08-14 25 Hyderabad  
## 9 9 Akshay REG9 2002-07-22 22 Cochin  
## 10 10 Mohit REG10 1998-10-01 26 Goa

#b) Access the age column.  
age\_column = students$age;age\_column

## [1] 24 25 23 26 24 27 23 25 22 26

#c) Find the maximum, minimum and average age from the dataframe.  
max\_age = max(age\_column);max\_age

## [1] 27

min\_age = min(age\_column);min\_age

## [1] 22

avg\_age = mean(age\_column);avg\_age

## [1] 24.5

#QUESTION 6  
#The data on income and expenditure for 9 months is given:  
#Income: 30000 55000 45045 32450 85000 74000 65435 64300 89000  
#Expenditure: 20000 35000 10000 15000 13000 30000 35000 24000 35000  
#a) Make a data frame using above data.  
income = c(30000, 55000, 45045, 32450, 85000, 74000, 65435, 64300, 89000);income

## [1] 30000 55000 45045 32450 85000 74000 65435 64300 89000

expend = c(20000, 35000, 10000, 15000, 13000, 30000, 35000, 24000, 35000);expend

## [1] 20000 35000 10000 15000 13000 30000 35000 24000 35000

money = data.frame(income = income, expend = expend);money

## income expend  
## 1 30000 20000  
## 2 55000 35000  
## 3 45045 10000  
## 4 32450 15000  
## 5 85000 13000  
## 6 74000 30000  
## 7 65435 35000  
## 8 64300 24000  
## 9 89000 35000

#b) Compute the variance of income and expenditure.  
var\_income = var(money$income);var\_income

## [1] 452209734

var\_expend = var(money$expend);var\_expend

## [1] 101611111

#c) Compute the correlation between income and expenditure.  
corr = cor(money$income,money$expend);corr

## [1] 0.4140725

#d) Obtain the cumulative expenditure.  
cum\_expend = cumsum(money$expend);cum\_expend

## [1] 20000 55000 65000 80000 93000 123000 158000 182000 217000

#e)e) Later on you realized to name 1 to 9 months as Jan till September. Store these names in a vector and then add to data frame.  
months = c("Jan", "Feb", "Mar", "Apr", "May", "Jun", "Jul", "Aug", "Sep")  
money$month = months;money

## income expend month  
## 1 30000 20000 Jan  
## 2 55000 35000 Feb  
## 3 45045 10000 Mar  
## 4 32450 15000 Apr  
## 5 85000 13000 May  
## 6 74000 30000 Jun  
## 7 65435 35000 Jul  
## 8 64300 24000 Aug  
## 9 89000 35000 Sep

##QUESTION7  
#a)  
Marks = matrix(c(45, 44, 25, 23, 19, 49, 37, 45, 33),   
 nrow = 3, ncol = 3, byrow = FALSE,  
 dimnames = list(c("Statistics", "Data Science", "Mathematics"),   
 c("Name 1", "Name 2", "Name 3")));Marks

## Name 1 Name 2 Name 3  
## Statistics 45 23 37  
## Data Science 44 19 45  
## Mathematics 25 49 33

#b)  
Name4\_marks = c(39, 32, 45)  
Marks = cbind(Marks, "Name 4" = Name4\_marks)  
Marks

## Name 1 Name 2 Name 3 Name 4  
## Statistics 45 23 37 39  
## Data Science 44 19 45 32  
## Mathematics 25 49 33 45

#c)  
Marks\_squared = Marks^2;Marks\_squared

## Name 1 Name 2 Name 3 Name 4  
## Statistics 2025 529 1369 1521  
## Data Science 1936 361 2025 1024  
## Mathematics 625 2401 1089 2025

#d)  
percentage\_matrix = (Marks / 50) \* 100;percentage\_matrix

## Name 1 Name 2 Name 3 Name 4  
## Statistics 90 46 74 78  
## Data Science 88 38 90 64  
## Mathematics 50 98 66 90