Task2.r

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```
#Create two matrices, matrix_A and matrix_B
matrix_A<-matrix(c(10,5,3,6,3,4,2,5,2),nrow = 3,ncol=3,byrow = TRUE,dimnames = list(c("mAR1","mAR2","mAR3"),c("mAC1","mAC2","mAC3")))
matrix_B<-matrix(c(2,4,1,9,4,2,7,6,4),nrow = 3,ncol=3,byrow = TRUE,dimnames = list(c("mBR1","mBR2","mBR3"),c("mBC1","mBC2","mBC3")))

#Calculate the sum of matrix_A and matrix_B and store the result in a new matrix named matrix_sum.
matrix_sum<-matrix_A+matrix_B
rownames(matrix_sum)=c("m(A+B)R1","m(A+B)R2","m(A+B)R3")
colnames(matrix_sum)=c("m(A+B)C1","m(A+B)C2","m(A+B)C3")
print("Matrix Sum")
```

```
## [1] "Matrix Sum"
```

```
print(matrix_sum)
```

```
##          m(A+B)C1 m(A+B)C2 m(A+B)C3
## m(A+B)R1       12        9        4
## m(A+B)R2       15        7        6
## m(A+B)R3        9       11        6
```

```
#Calculate the difference between matrix_A and matrix_B and store the result in a new matrix named matrix_diff.
matrix_diff<-matrix_A-matrix_B
rownames(matrix_diff)=c("m(A-B)R1","m(A-B)R2","m(A-B)R3")
colnames(matrix_diff)=c("m(A-B)C1","m(A-B)C2","m(A-B)C3")
print("Matrix Diffrence")
```

```
## [1] "Matrix Diffrence"
```

```
print(matrix_diff)
```

```
##          m(A-B)C1 m(A-B)C2 m(A-B)C3
## m(A-B)R1        8        1        2
## m(A-B)R2       -3       -1        2
## m(A-B)R3       -5       -1       -2
```

```
#Multiply matrix_A by a scalar value of 2 and store the result in a new matrix named matrix_mult
matrix_mult<-matrix_A *2
rownames(matrix_mult)=c("m(A.2)R1","m(A.2)R2","m(A.2)R3")
colnames(matrix_mult)=c("m(A.2)C1","m(A.2)C2","m(A.2)C3")
print("Matrix Multiplication By 2")
```

```
## [1] "Matrix Multiplication By 2"
```

```
print(matrix_mult)
```

```
##          m(A.2)C1 m(A.2)C2 m(A.2)C3
## m(A.2)R1       20       10        6
## m(A.2)R2       12        6        8
## m(A.2)R3        4       10        4
```

```
#Calculate the product of matrix_A and matrix_B and store the result in a new matrix named matrix_product
matrix_product<-matrix_A %% matrix_B
rownames(matrix_product)=c("m(A*B)R1","m(A*B)R2","m(A*B)R3")
colnames(matrix_product)=c("m(A*B)C1","m(A*B)C2","m(A*B)C3")
print("Matrix Product")
```

```
## [1] "Matrix Product"
```

```
print(matrix_product)
```

```
##          m(A*B)C1 m(A*B)C2 m(A*B)C3
## m(A*B)R1        0        1        0
## m(A*B)R2        6        3        0
## m(A*B)R3        2        5        2
```

```
#Find the transpose of matrix_A and store the result in a new matrix named matrix_A_transpose
matrix_A_transpose<-t(matrix_A)
print("Matrix A Transpose")
```

```
## [1] "Matrix A Transpose"
```

```
print(matrix_A_transpose)
```

```
##      mAR1 mAR2 mAR3
## mAC1   10    6    2
## mAC2    5    3    5
## mAC3    3    4    2
```

```
#Calculate the determinant of matrix_B and store it in a variable named determinant_B
determinant_B<-det(matrix_B)
print("Matrix B Determinant")
```

```
## [1] "Matrix B Determinant"
```

```
print(determinant_B)
```

```
## [1] -54
```

```
#Invert matrix_B to obtain the inverse matrix and store it in a new matrix named matrix_B_inverse
matrix_B_inverse<-solve(matrix_B)
print("Matrix B Inverse")
```

```
## [1] "Matrix B Inverse"
```

```
print(matrix_B_inverse)
```

```
##             mBR1        mBR2        mBR3
## mBC1 -0.07407407  0.18518519 -0.07407407
## mBC2  0.40740741 -0.01851852 -0.09259259
## mBC3 -0.48148148 -0.29629630  0.51851852
```

```
#Check if matrix_B is orthogonal (i.e., its transpose is equal to its inverse)
print("Checking If Matrix B is Orthogonal ...")
```

```
## [1] "Checking If Matrix B is Orthogonal ..."
```

```
matrix_B_transpose<-t(matrix_B)
orthogonal_B<-matrix_B_transpose==matrix_B_inverse
c=0
for (x in orthogonal_B) {
  if(x==FALSE){
    c=1
    break
  }
}
if(c==0){
  print("It is orthogonal")
}else{
  print("It is not orthogonal")
}
```

```
## [1] "It is not orthogonal"
```

```
#Calculate the element-wise square root of matrix_A and store the result in a new matrix named matrix_A_sqrt
matrix_A_sqrt<-sqrt(matrix_A)
print("SquareRoot of Matrix A")
```

```
## [1] "SquareRoot of Matrix A"
```

```
print(matrix_A_sqrt)
```

```
##          mAC1     mAC2     mAC3
## mAR1 3.162278 2.236068 1.732051
## mAR2 2.449490 1.732051 2.000000
## mAR3 1.414214 2.236068 1.414214
```

```
#Calculate the mean of all the elements in matrix_B
mean_matrix_B<-mean(matrix_B)
print("Mean of Matrix A ")
```

```
## [1] "Mean of Matrix A "
```

```
print(mean_matrix_B)
```

```
## [1] 4.333333
```

```
#Calculate the sum of each column in matrix_A.
sum_matrix_A<-c(sum(matrix_A[,1]),sum(matrix_A[,2]),sum(matrix_A[,3]))
print("Matrix A Colomn Sum")
```

```
## [1] "Matrix A Colomn Sum"
```

```
print(sum_matrix_A)
```

```
## [1] 18 13  9
```

```
#Calculate the row means of matrix_B.
row_means_matrix_B<-c(mean(matrix_B[1,]),mean(matrix_B[2,]))
print("Matrix B Row Mean")
```

```
## [1] "Matrix B Row Mean"
```

```
print(row_means_matrix_B)
```

```
## [1] 2.333333 5.000000
```

```
#Extract the second row of matrix_A and store it in a vector named second_row_A
second_row_A<-matrix_A[2,]
print("Second Row of Matrix A")
```

```
## [1] "Second Row of Matrix A"
```

```
print(second_row_A)
```

```
## mAC1 mAC2 mAC3
##    6    3    4
```

```
#Extract the third column of matrix_B and store it in a vector named third_column_B
third_column_B<-matrix_B[,3]
print("Third Column of Matrix B")
```

```
## [1] "Third Column of Matrix B"
```

```
print(third_column_B)
```

```
## mBR1 mBR2 mBR3
##    1    2    4
```