Homework 1

Math 20011

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1. **Create a vector a = (5,10,15,20,...,200).**

vector a is a sequence from 5 to 200 where each element is an increase of 5

so a <- seq(5, 200, 5)

so a = (5,10,15,20...200)

* 1. **How many elements are there in a?**

length(a) = 40

There are 40 elements in the vector a

* 1. **What are the 10th, 19th and 22nd elements of a?**

a[10] = 50, so 50 is the 10th element of a

a[19] = 95 so 95 is the 19th element of a

a[22] = 110 so 110 is the 22nd element of a

* 1. **Create a vector which is obtained by multiplying each element of a by 0.1.**

tenthVec = a \* 0.1 creates tenthVec which contains each element of a multiplied by 0.1

so tenthVec = (0.5, 1.0, 1.5, 2.0, ...., 20.0)

* 1. **Create a vector which consists of odd numbers of a.**

oddVec <- subset(a, a %% 2 == 1)

so since any odd number divided by 2 leaves a remainder of 1, a %% == 1 will only be true for all odd elements

so oddVec = (5, 15, 25, 35, ..., 195)

* 1. **Sum over all even elements of a.**

Since sum(subset(a, a %% 2 == 0)) returns 2100, and a %% 2 == 0 will be true for all even elements, the sum of all even elements in a is 2100

* 1. **Create a vector which consists of elements of a divisible by 3.**

threesVec <- subset(a, a %% 3 == 0), since a %% 3 == 0 is true for all elements divisible by 3, threesVec = (15, 30, 45, 60, ..., 195)

1. **Create a matrix A (3 rows and 3 columns) by ordering the vector (5,6,7,...,13) by rows.**

A <- matrix(5:13, nrow = 3, nrow = 3)

so

* 1. **Find the second row of A.**

A[,2] = 8 9 10 so

the second row of A is (8, 9, 10)

* 1. **Find third column of A.**

A[3,] = 7 10 13

so the third column of A is (7, 10, 13)

* 1. **Find the transpose of A.**

t(A) =

[,1] [,2] [,3]

[1,] 5 6 7

[2,] 8 9 10

[3,] 11 12 13

So the tranpose of A is

5 6 7

8 9 10

11 12 13

* 1. **Create a diagonal matrix B consisting diagonal elements of A.**

B <- diag(diag(A), nrow(A), ncol(A))

so B is a diagonal matrix formed from the diagonal elements of matrix A, with the same number of rows and columns as A which is

* 1. **Find the inverse of B.**

inverseB <- solve(B) =

[,1] [,2] [,3]

[1,] 0.2 0.0000000 0.00000000

[2,] 0.0 0.1111111 0.00000000

[3,] 0.0 0.0000000 0.07692308

so inverse of B is

* 1. **Create a matrix by adding one more column with elements (2, 1, 5) to A.**

newA <- cbind(A,c(2,1,5)) added the vector (2,1,5) as a column to A and created matrix newA so now

* 1. **Create a matrix by adding one more row with elements (0.3,−1.1,3.5) to A.**

newRowA <- rbind(A,c(0.3,-1.1,3.5)) added the vector (0.3,-1.1,3.5) as a row to A and created matrix newRowA so now