PS2 Mark Scheme

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0. preliminaries AND comments [6]

```
##clear memory [1]
rm(list=ls()); gc(); graphics.off()
```

```
##          used (Mb) gc trigger (Mb) limit (Mb) max used (Mb)
## Ncells 450648 24.1     972308   52         NA   630514 33.7
## Vcells 877016  6.7    8388608   64      16384  1767157 13.5
```

```
##comments and submission [5]
```

1. Code Reading [4]

Though the following two codes are almost the same, they are serving differnt purpose. V1 will directly print out two different solutions when 'condition_sqr_positive' is positive and 'a' is not equal to 0. V2 will store both sol_1 and sol_2 to solution vector, and then return the solution vector. However both functions will report error when a!= 0 since sol_1 and sol_2 will not be initialized.

2. Fibonacci sequence [10]

```
##function to check integers [2]
check.integer=function(N) {
  if (N<=0) {
    print ('Please enter positive number.')
    return (FALSE)
  } else{
    return (TRUE)
  }
}

##non-recursive version [8] **This fibonacci sequence starts from 0
fibonacci=function(N){
  f0=0
  f1=1
  if (check.integer(N)) {
    for(i in 1:N){
      if(i==1) {
        solution=f0
      } else if(i==2) {
        solution=f1
      } else {
        f=f0+f1
        f0=f1
        f1=f
        solution=f
      }
    }
```

```
    return (solution)
  }
}

##recursive version **This fibonacci sequence starts from 1
fibonacci=function(N) {
    if(N<=1) {
      return(N)
    } else {
      return(fibonacci(N-1) + fibonacci(N-2))
    }
}
```

3. Matrix Multiplication [10]

```
##define matrix
A = matrix(c(0,5,3,5,5,2),nrow=2,ncol=3)
B = matrix(c(3,3,4,4,-2,-2),nrow=3,ncol=2)

##matMult function [10]
matMult = function(A,B){
  mat = matrix(0 , nrow(A) , ncol(B) , TRUE)
  if (ncol(A)!=nrow(B)) {
    return ('Wrong matrix multiplication format.') ##qualification check
  } else {
    for (i in 1:nrow(A)) {
      for (j in 1:ncol(B)) {
        for (k in 1:ncol(A)) {
          mat[i,j] = mat[i,j] + A[i,k]*B[k,j]
        }
      }
    }
  }
  return (mat)
}

##print matrix C as result
C = matMult(A,B)
print(C)
```

```
##      [,1] [,2]
## [1,]   29  -16
## [2,]   38    6
```