Solutions PC2b

1

```
# Shows the beauty of math!
leftnum <- 0
for(i in 1:9){
  leftnum <- leftnum*10+i
  result <- leftnum*8+i
  cat(leftnum,"x 8 +",i,"=",result,"\n")
}
```

You can also use cat(sprint()):

```
leftnum <- 0
for(i in 1:9){
  leftnum <- leftnum*10+i
  result <- leftnum*8+i
  cat(sprintf("%d x 8 + %d = %d\n",leftnum,i,result))
}
```

2a.

```
pyramid <- function(height){

  if(height>0 & height<9){
    for(i in 1:height){
      for(j in 1:height){
        if(j>(height-i)) cat("#")
        else cat(" ")
      }
      cat("\n")
    }
  }
}
```

2b.

```
pyramid2 <- function(height){
  if(height>0 & height<9){
    for(i in 1:height){
      for(j in 1:height){
        if(j>(height-i)) cat("#")
        else cat(" ")
      }
      cat("  ")
      for(j in 1:height){
        if(j<=i) cat("#")
      }
      cat("\n")
    }
  }
}
```

3.

What is the greatest product of four adjacent numbers in the same direction (up, down, left, right, or diagonally) in the 20×20 grid?
Answer: 70,600,674

```
vec=c(08,02,22,97,38,15,00,40,00,75,04,05,07,78,52,12,50,77,91,08,
      49,49,99,40,17,81,18,57,60,87,17,40,98,43,69,48,04,56,62,00,
      81,49,31,73,55,79,14,29,93,71,40,67,53,88,30,03,49,13,36,65,
      52,70,95,23,04,60,11,42,69,24,68,56,01,32,56,71,37,02,36,91,
      22,31,16,71,51,67,63,89,41,92,36,54,22,40,40,28,66,33,13,80,
      24,47,32,60,99,03,45,02,44,75,33,53,78,36,84,20,35,17,12,50,
      32,98,81,28,64,23,67,10,26,38,40,67,59,54,70,66,18,38,64,70,
      67,26,20,68,02,62,12,20,95,63,94,39,63,08,40,91,66,49,94,21,
      24,55,58,05,66,73,99,26,97,17,78,78,96,83,14,88,34,89,63,72,
      21,36,23,09,75,00,76,44,20,45,35,14,00,61,33,97,34,31,33,95,
      78,17,53,28,22,75,31,67,15,94,03,80,04,62,16,14,09,53,56,92,
      16,39,05,42,96,35,31,47,55,58,88,24,00,17,54,24,36,29,85,57,
      86,56,00,48,35,71,89,07,05,44,44,37,44,60,21,58,51,54,17,58,
      19,80,81,68,05,94,47,69,28,73,92,13,86,52,17,77,04,89,55,40,
      04,52,08,83,97,35,99,16,07,97,57,32,16,26,26,79,33,27,98,66,
      88,36,68,87,57,62,20,72,03,46,33,67,46,55,12,32,63,93,53,69,
      04,42,16,73,38,25,39,11,24,94,72,18,08,46,29,32,40,62,76,36,
      20,69,36,41,72,30,23,88,34,62,99,69,82,67,59,85,74,04,36,16,
      20,73,35,29,78,31,90,01,74,31,49,71,48,86,81,16,23,57,05,54,
      01,70,54,71,83,51,54,69,16,92,33,48,61,43,52,01,89,19,67,48)
x=matrix(vec,20,20)

Right <- function(x,i,j,pmax){
  p=x[i,j]*x[i,j+1]*x[i,j+2]*x[i,j+3]
  if(p>pmax) pmax<-p
  return(pmax)
}

Down <- function(x,i,j,pmax){
  p=x[i,j]*x[i+1,j]*x[i+2,j]*x[i+3,j]
  if(p>pmax) pmax<-p
  return(pmax)
}

RightDown <- function(x,i,j,pmax){
  p=x[i,j]*x[i+1,j+1]*x[i+2,j+2]*x[i+3,j+3]
  if(p>pmax) pmax<-p
  return(pmax)
}

LeftDown <- function(x,i,j,pmax){
  p=x[i,j]*x[i+1,j-1]*x[i+2,j-2]*x[i+3,j-3]
  if(p>pmax) pmax<-p
  return(pmax)
}

pmax <- 0
for(i in 1:20){
  for(j in 1:20){
    if (j<18) pmax<-Right(x,i,j,pmax)
    if (i<18) pmax<-Down(x,i,j,pmax)
    if ((i<18) & (j<18)) pmax<-RightDown(x,i,j,pmax)
    if ((i<18) & (j>3)) pmax<-LeftDown(x,i,j,pmax)
  }
}
print(pmax)
```