

```

import math

def createBackground(maxWidth,maxHeight):

    #initialises image to white

    arrAll=[]

    arrRow=[]

    for intRows in range(maxWidth):

        for intCols in range(maxWidth):

            arrRow.append(0)

        arrAll.append(arrRow)

        arrRow=[]

    return arrAll

def drawCircleBorder(arrPage, centreX, centreY, longRadius, shortRadius):

    for x in range(longRadius * -1, longRadius + 1):

        for y in range(longRadius * -1, longRadius + 1):

            lengthOfLine = round(math.sqrt(x**2+y**2))

            if longRadius >= lengthOfLine and shortRadius <= lengthOfLine:

                arrPage[round(x+centreX)][round(y+centreY)]=1

    return arrPage

def saveFile(arrAll, maxRows, maxCols,fileName,versionNum):

    myfile=open(fileName+str(versionNum)+".pbm",'w')

    myfile.write('P1' +"\n")

    myfile.write(str(maxRows)+" "+str(maxCols)+"\n")

    for intRows in range(maxRows):

        myfile.write(getArray(arrAll[intRows])+"\n")

    myfile.close()

```

```
def getArray(passedValue):  
    strOutString=""  
    for intVal in passedValue:  
        strOutString=strOutString+str(intVal)  
    return strOutString  
  
def main():  
    arrPage = []  
    strFileName="HollowCircleE"  
    intVersionNumber = 0  
    intMaxCols=800  
    intMaxRows=800  
    for counter in range(0, 1):  
        arrPage = createBackground(intMaxCols,intMaxRows)  
        arrPage = drawCircleBorder(arrPage, intMaxCols/2,intMaxRows/2, 300, 250)  
        saveFile(arrPage,intMaxRows, intMaxCols,strFileName, intVersionNumber)  
        intVersionNumber+=1  
        arrPage=[]  
  
if __name__ == "__main__":  
    main()  
  
print("Programme finished")
```

