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from random import seed
from random import randint
import math
def createBackground(maxWidth,maxHeight,r,g,b):
    arrAll=[]
    arrRow=[]
    colourByte=[]
    red=r
    green=g
    blue=b
    for intRows in range(maxHeight):
        colourByte.append(red)
        colourByte.append(green)
        colourByte.append(blue)
        for intCols in range(maxWidth):
            arrRow.append(colourByte)
        arrAll.append(arrRow)
        arrRow=[]
        colourByte = []
        if intRows < 255:
            green += 1
        elif intRows >= 255 and intRows <511:
            if intRows == 255:
                red = 255
                blue = 0
            else:
                blue += 1
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        red -= 1

    elif intRows >= 512 and intRows < 764:

        green -=1

    else:

        blue -=1

    arrRow=[]

    colourByte = []

    return arrAll

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def drawCircle(arrPage, centreX, centreY, radius, r, g, b):

    colourByte=[]

    colourByte.append(r)

    colourByte.append(g)

    colourByte.append(b)

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

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

            if radius > round(math.sqrt(x**2+y**2)) :

                arrPage[int(x)+centreX][int(y+centreY)] = colourByte

    return arrPage

```

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def drawCircleBorder(arrPage, centreX, centreY, longRadius, shortRadius,r, g, b):

    colourByte=[]

    colourByte.append(r)

    colourByte.append(g)

    colourByte.append(b)

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

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

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

if longRadius >= lengthOfLine and shortRadius <= lengthOfLine:

    arrPage[int(x+centreX)][int(y+centreY)]=colourByte

return arrPage

```

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def saveToFile(Page,NameOfFile,VNum,cols,rows):

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    myfile=open(NameOfFile+str(VNum)+".ppm",'w')

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    myfile.write('P3' +"\n")

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    myfile.write(str(cols)+" "+str(rows)+"\n")

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    myfile.write(str(255)+"\n")

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    for row in Page:

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        for cVal in row:

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            for c in cVal:

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                myfile.write(str(c)+' ')

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            myfile.write('\n')

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    myfile.close()

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def main():

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    strFileName="ColoursAnnulus"

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    intFileFrame=1

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    intMaxCols=800

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    intMaxRows=800

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    arrPage=createBackground(intMaxCols,intMaxRows, 255,0,0)

```

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    arrPage = drawCircleBorder(arrPage, int(intMaxCols/2),int(intMaxRows/2),398,370,60,60,160)

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    arrPage = drawCircleBorder(arrPage, int(intMaxCols/2),int(intMaxRows/2),340,310,60,60,160)

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    arrPage = drawCircleBorder(arrPage, int(intMaxCols/2),int(intMaxRows/2),280,250,60,60,160)

```

```
arrPage = drawCircleBorder(arrPage, int(intMaxCols/2),int(intMaxRows/2),220,190,60,60,160)
```

```
arrPage = drawCircleBorder(arrPage, int(intMaxCols/2),int(intMaxRows/2),160,130,60,60,160)
```

```
arrPage = drawCircle(arrPage, int(intMaxCols/2), int(intMaxRows/2), 80, 60, 60, 160)
```

```
saveToFile(arrPage,strFileName,intFileFrame, intMaxRows, intMaxCols)
```

```
if __name__ == "__main__":
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```
    main()
```

```
print("Programme finished")
```