COMP 312 Assignment 1

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1 Python

1.1 Program 1.a

```
blackD = {'blacka': 100}
blackD['blackb'] = 200

blackprint blackD
```

1.2 Program 1.b

```
blackD = {'blackb': 200, 'blacka': 100}

blackfor blackk ForestGreenin blackD.blackkeys():
    BrickRedif blackD[blackk] == 200:
        blackdel blackD[blackk]

blackprint blackD
```

1.3 Program 1.c

```
blackL = [100]

blackL.blackappend(200)

blackprint blackL
```

1.4 Program 1.d

```
blackL = [100, 200]

blackL.blackremove(200)

blackprint blackL
```

1.5 Program 1.e

```
blackT = (100, 200, 300)

blacka, blackb, blackc = blackT

blackprint blacka
blackprint blackb
blackprint blackc
```

1.6 Program 2.a / 2.b

```
blackimport blackrandom
blackimport blackmath

blackN = 1000000

blackrandom.blackseed(123)

blackcircleRadi = []
blackfor blacki ForestGreenin blackrange(0, blackN):
          blackr = blackrandom.blackrandom();
          blackA = blackmath.blackpi * blackmath.blackpow(blackr, 2)

          blackcircleRadi.blackappend((blackr, blackA))

blacksumR = 0
blacksumRSquare = 0
blacksumA = 0
blackfor blackcircle ForestGreenin blackcircleRadi:
          blackr, blacka = blackcircle

          blacksumR += blackr
          blacksumRSquare += blackmath.blackpow(blackr, 2)
          blacksumA += blacka

blackmeanR = (1.0/blackN) * blacksumR
blackmeanRSquare = (1.0/blackN) * blacksumRSquare
blackmeanA = (1.0/blackN) * blacksumA

blackprint "blackMean blackR: " + ForestGreenstr(blackmeanR)
blackprint "blackMean blackSquared blackR: " + ForestGreenstr(blackmeanRSquare)
blackprint "blackpi(blackmeanR)^2: " + ForestGreenstr(blackmath.blackpi * blackmath.blackpo
blackprint "blackMean blackA: " + ForestGreenstr(blackmeanA)
```

1.6.1 Discussion

We get the value of $meanR$ to be 0.500088544935 which makes sense. We are generating random numbers over the range [0.0, 1.0). Assuming these numbers are uniformly distributed we would expect these numbers to average up to $\frac{0.0+1.0}{2} = 0.5$.
From an initial inspection of the data we would expect to see that $meanA = \pi(meanR)^2$. However they don't and this dependency is caused by the fact that for some list of numbers $L = (l_1, ..., l_n)$

$$\sum_{k=1}^{n} l_1^2 \neq (\sum_{k=1}^{n} l_1)^2$$

so if we square each r and sum them up we get 0.333439307864. Then multiplying this by PI gives us $\pi * 0.333439307864 = 1.04753048 = meanA$