Exercise 1:

- After 7430000 departures: avgWait=5.530658049364452 avgSystemTime=7.0307692633769765
- The customer just choose a random queue
- After 9211000 departures: avgWait=1.9952709836764186 avgSystemTime=3.4667403493575204

phase transition

5, 8-11, 13-14, 19, 23, 25-29, 31-34, 40, 44, 46, 48.

$C_k^n = \frac{n!}{(n-k)!k!}$

Exercise 5:

- Pr[X≤2] = 0.784
- Pr[X≤3] = 1
- Pr[X≤0] = 0.064
- Pr[X≤1] = 0.352
- Pr[X=0] = $(1-p)^3$
- Pr[X=1] = $C_3^2(1-p)^2 * p$
- Pr[X=2] = $C_3^2(1-p) * p^2$
- Pr[X=3] = p^3

Exercise 8:

Pr = (1-p-p*(1-p))*p = 0.096

`Pr[1st h appears on 3rd flip]=0.095991`

Exercise 9:

Pr[X=3] for p = 0.6 will be higher

Pr[X=3] = (1-p)^2*p

Pr = 0.096 for p = 0.6

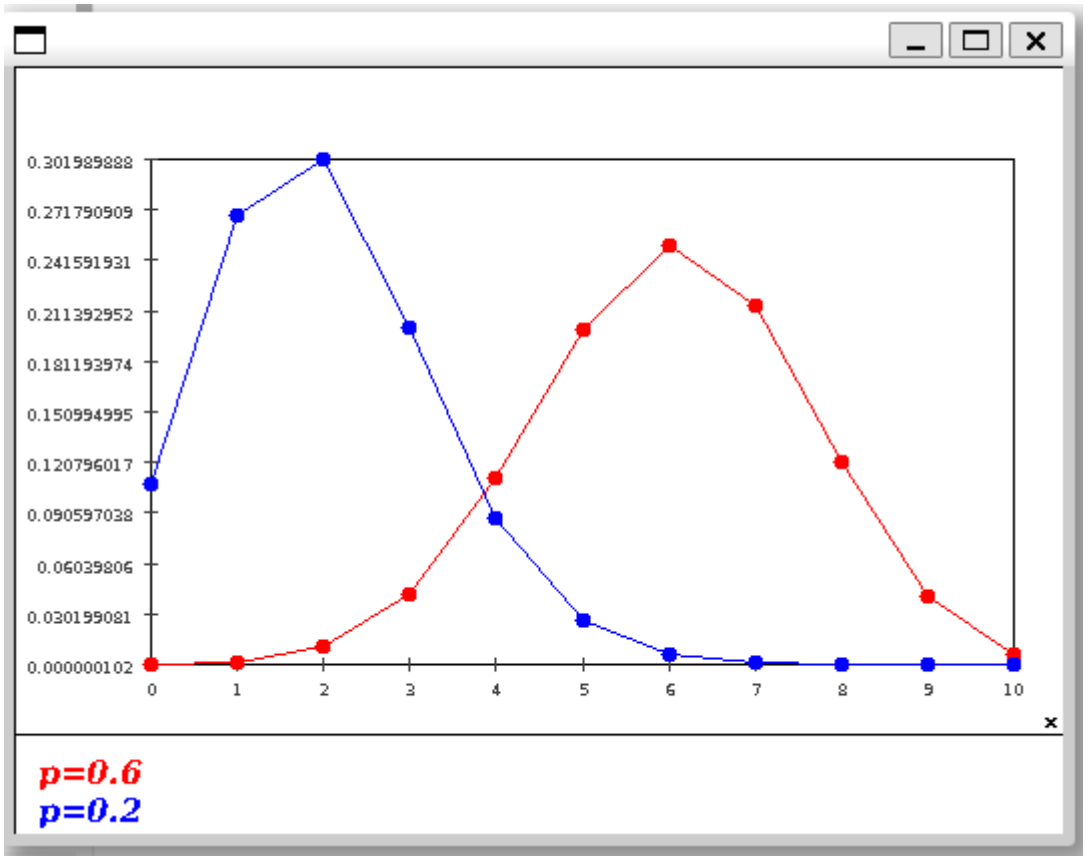
Pr = 0.032 for p = 0.8

Exercise 10:

$Pr[X > k] = (1-p)^k$

Exercise 11:

`Pr[X=3] = 0.042467328000000006`



`Pr[3 H in 10 flips]=0.042469`

Exercise 13:

$\sum \frac{\gamma^k}{k!} = e^{\gamma}$

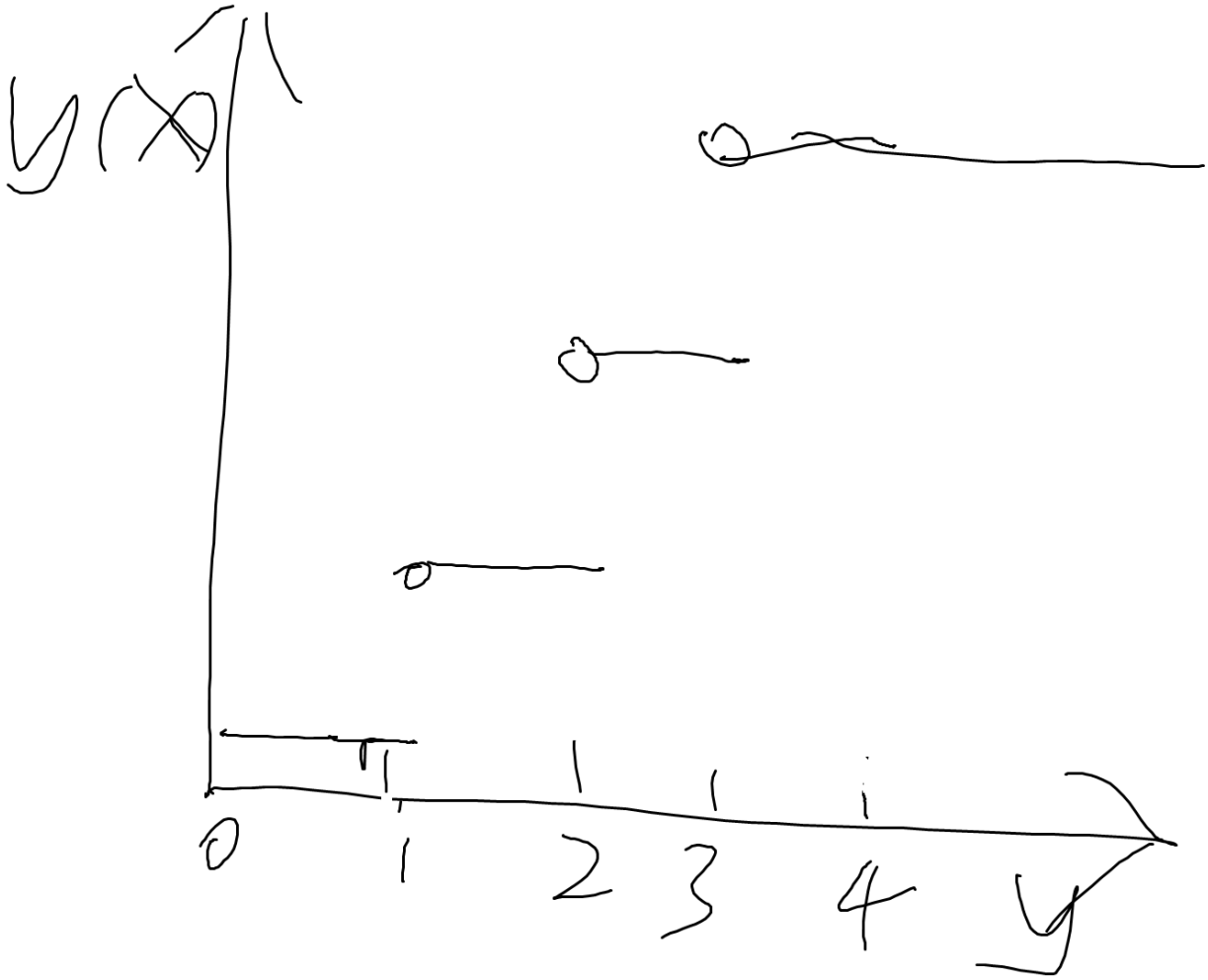
$e^{\gamma} * e^{-\gamma} = 1$

Exercise 14:

Prob: 0.1813

This value is very approx to the P[X=3] in Poisson (2)

Exercise 19:

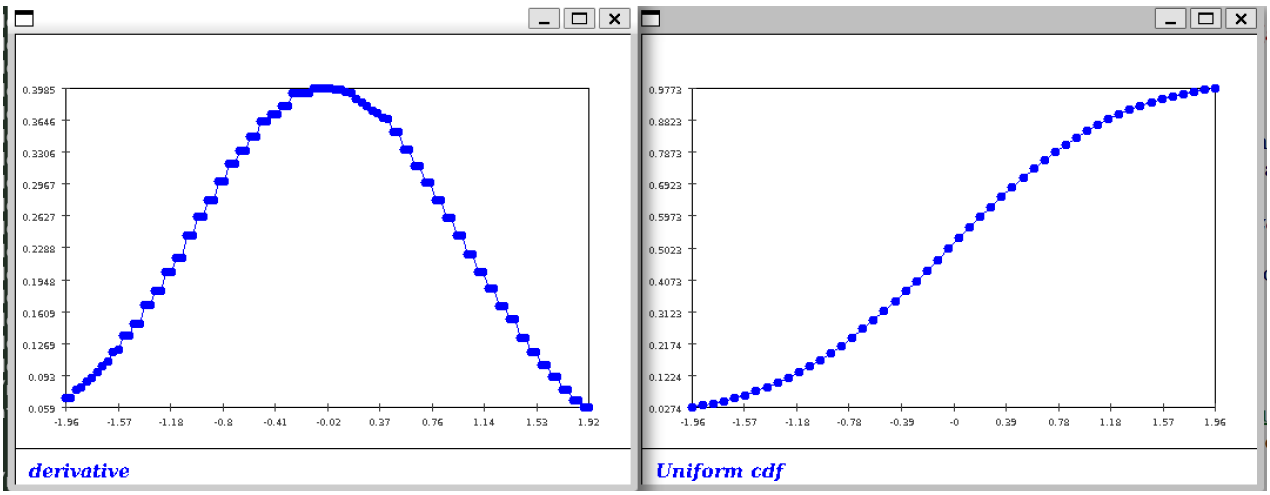


Exercise 25

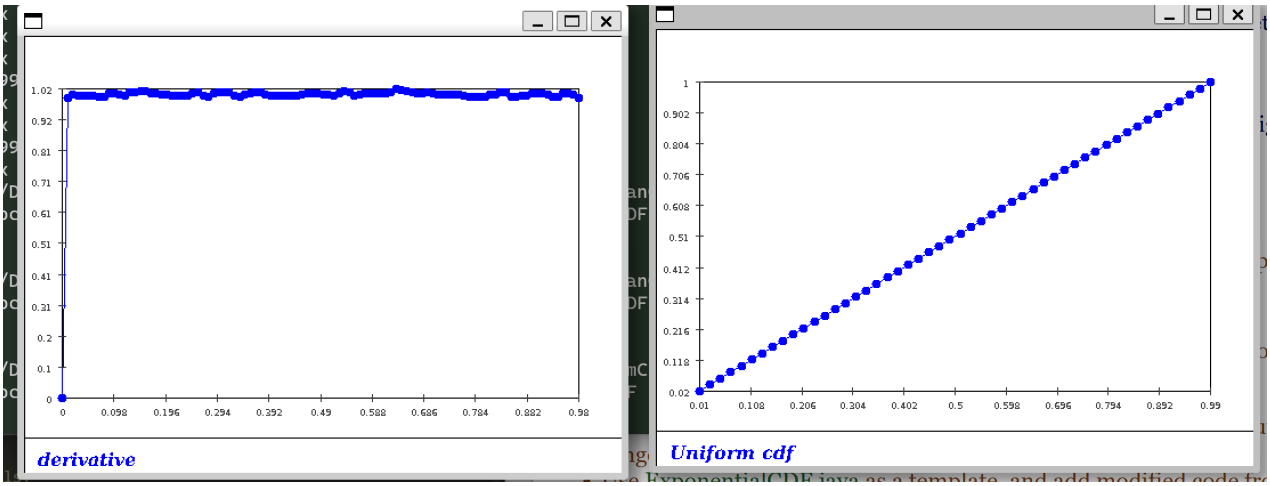
```
Pr[0<X≤2]:0.462294
Pr[X>0]:0.462294
```

Exercise 26

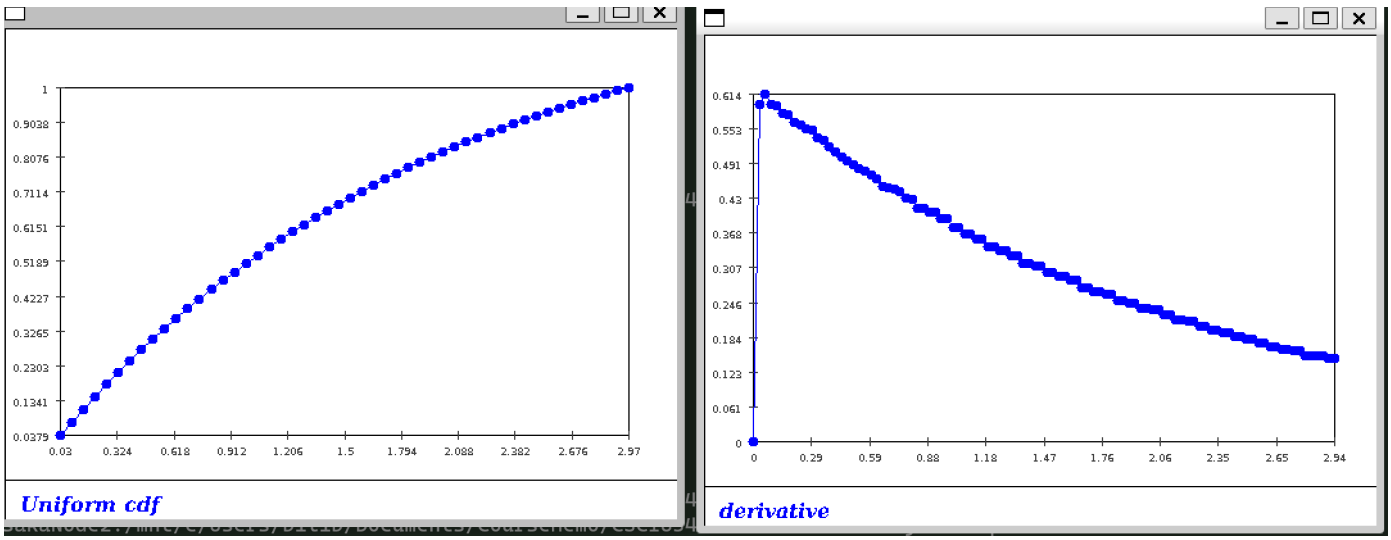
- Gussian



- Uniform



Exercise 27



Exercise 28:

E[X] = 1.8

For Pr[H]=0.5, E[X] = 1.5

Exercise 29:

The calculation is exactly the same as in the 3-coin-flip example above

Exercise 31:

Becomes the probability of k heads

Exercise 32:

```
E= 1.8000819999999997
```

result is accurate comparing to the earlier results

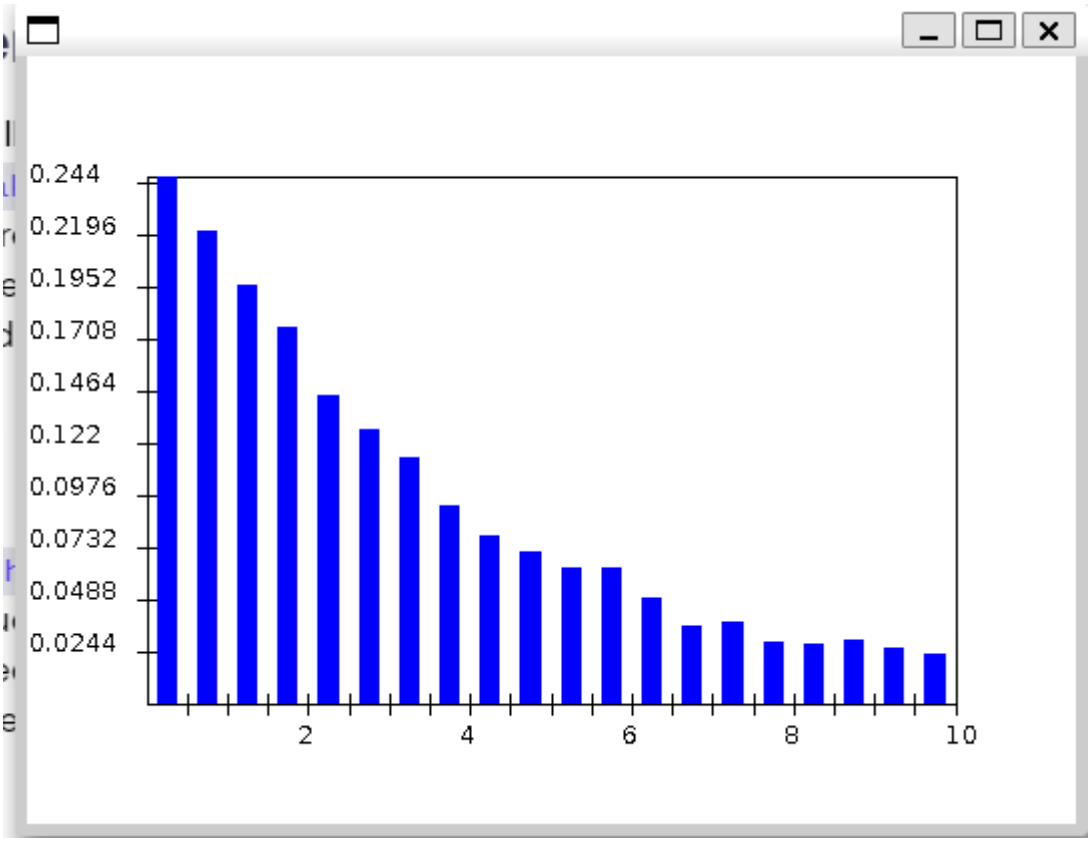
Exercise 33:

```
E= 10.00
```

Exercise 34:

See java files, the accuracy doesn't improve much when using more intervals in expectation computation.

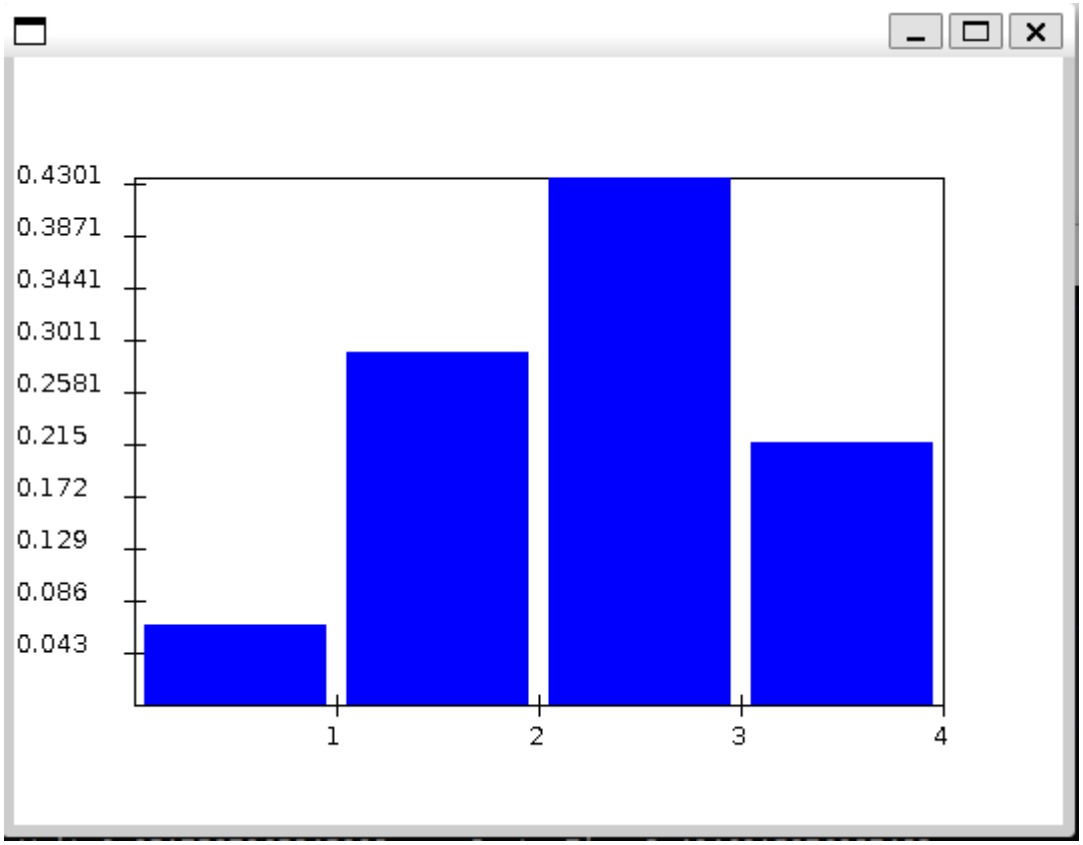
Exercise 40:



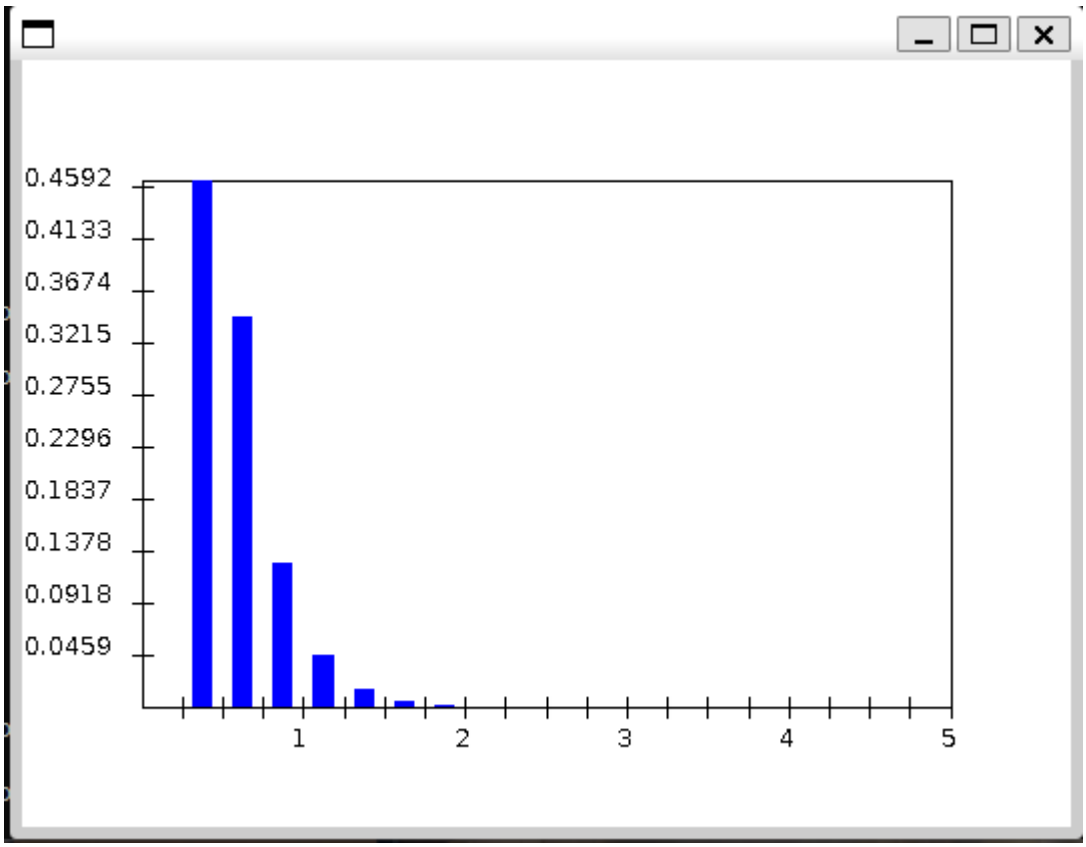
Exercise 44:

$F^{-1}(y) = \frac{log(\frac{y}{\gamma})}{-\gamma}$

Exercise 46:


0.4301
0.3871
0.3441
0.3011
0.2581
0.215
0.172
0.129
0.086
0.043
1
2
3
4

Exercise 48:


0.4592
0.4133
0.3674
0.3215
0.2755
0.2296
0.1837
0.1378
0.0918
0.0459
1
2
3
4
5