

Information (theoretical predictions) for PHO5 mutants and wild type strain

April 18, 2021

```
[1]: import math
#define the probability of n number of microstates
def ent(n):
    pr = 0
    sum = 0
    for i in range(n):
        print("The probability of microstate",i+1)
        p =float(input())
        if p == 0:
            p = 0.0001
        else:
            p = p
        pr += p
        sum += p*math.log(p,2)
    s = -(sum)
    print("Entropy for your system =",-sum)
    print("sum of probablity=", pr)
    return s
```

1 Information for wild type (PHO4, PHO80, repressed PHO5 state and wild type TATA box)- figure 5E

```
[2]: ent(8)
```

```
The probability of microstate 1
0.54
The probability of microstate 2
0.1
The probability of microstate 3
0.18
The probability of microstate 4
0.1
The probability of microstate 5
```

```
0.035
The probability of microstate 6
0.01
The probability of microstate 7
0.035
The probability of microstate 8
0.0001
Entropy for your system = 1.9960587460632857
sum of probablity= 1.0001
```

[2]: 1.9960587460632857

2 Information for PHO4, pho80(activated PHO5 state and wild type TATA box) - Figure 4A

[3]: ent(8)

```
The probability of microstate 1
0.057
The probability of microstate 2
0.092
The probability of microstate 3
0.092
The probability of microstate 4
0.092
The probability of microstate 5
0.145
The probability of microstate 6
0.145
The probability of microstate 7
0.145
The probability of microstate 8
0.23
Entropy for your system = 2.885151719539934
sum of probablity= 0.998
```

[3]: 2.885151719539934

3 Information for PHO4, PHO80, pho2(repressed PHO5 state and wild type TATA box) - Figure 5D

[4]: ent(8)

```

The probability of microstate 1
0.51
The probability of microstate 2
0.1
The probability of microstate 3
0.195
The probability of microstate 4
0.1
The probability of microstate 5
0.04
The probability of microstate 6
0.02
The probability of microstate 7
0.03
The probability of microstate 8
0.005
Entropy for your system = 2.108331338692017
sum of probablity= 1.0

```

[4]: 2.108331338692017

4 Information for pho4, pho80(repressed PHO5 state and mutant type TATA box) - Figure 5C

[6]: ent(8)

```

The probability of microstate 1
0.65
The probability of microstate 2
0.075
The probability of microstate 3
0.18
The probability of microstate 4
0.075
The probability of microstate 5
0.01
The probability of microstate 6
0.001
The probability of microstate 7
0.01
The probability of microstate 8
0.001
Entropy for your system = 1.5626285902746593
sum of probablity= 1.0019999999999998

```

[6]: 1.5626285902746593

5 Information for pho4[85-99], pho80(partially activated PHO5 state and mutant type TATA box) - Figure 5B

[7]: `ent(8)`

```
The probability of microstate 1
0.3
The probability of microstate 2
0.03
The probability of microstate 3
0.29
The probability of microstate 4
0.08
The probability of microstate 5
0.125
The probability of microstate 6
0.10
The probability of microstate 7
0.015
The probability of microstate 8
0.06
Entropy for your system = 2.523878626718875
sum of probability= 0.9999999999999998
```

[7]: 2.523878626718875

6 Information for PHO4, pho80(activated PHO5 state and mutant type TATA box) - Figure 5A

[8]: `ent(8)`

```
The probability of microstate 1
0.0547
The probability of microstate 2
0.0547
The probability of microstate 3
0.1569
The probability of microstate 4
0.0547
The probability of microstate 5
0.1881
The probability of microstate 6
0.0547
The probability of microstate 7
0.1881
```

```
The probability of microstate 8  
0.2357  
Entropy for your system = 2.7347604109902397  
sum of probablity= 0.9875999999999998
```

```
[8]: 2.7347604109902397
```

```
[ ]:
```