Question 1

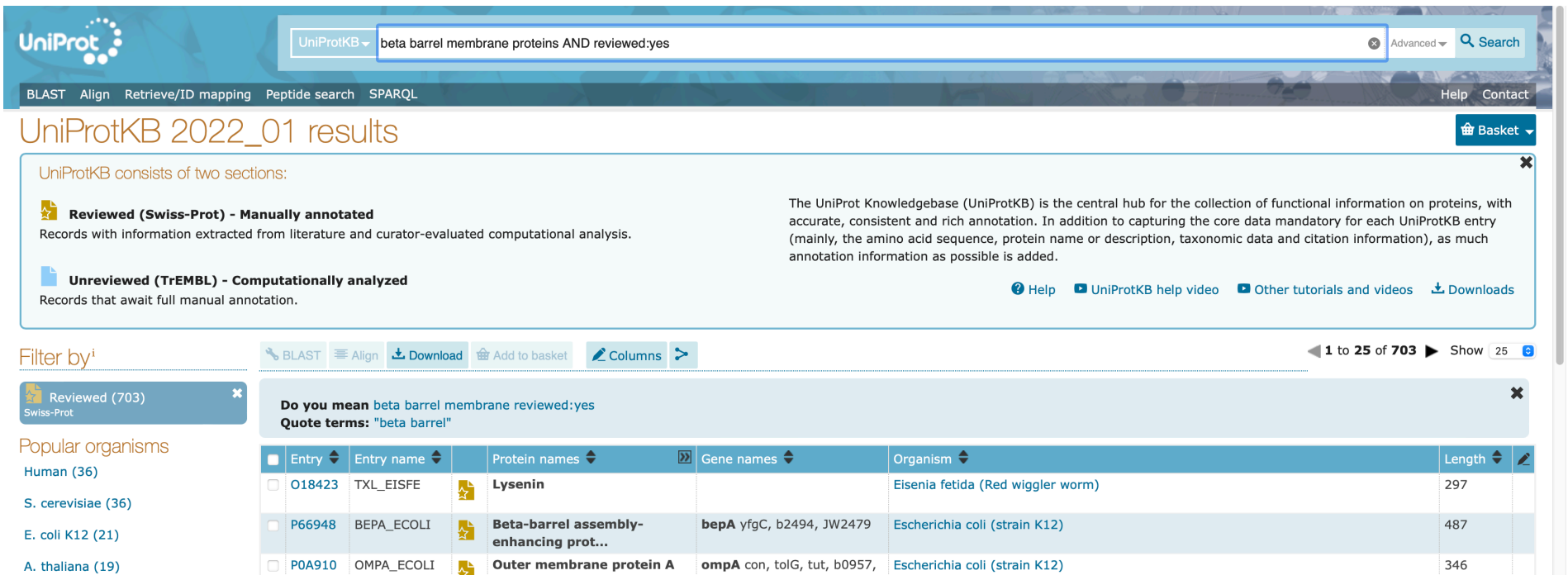
In [16]:
```
import string
import pandas as pd
import numpy as np
aas = set(string.ascii_uppercase) - set("BJOZXU")
a = "AMENLNMDLLYMAAAVMMGLAAIGAAIGIGILGGKFLEGAARQPDLIPLLRTQFFIVMGLVDAIPMIAVG LGLYVMFAVA".replace(" ", '')
b = "AADVSAAVGATGQSGMTYRLGLSWDWDKSWWQTSTGRLTGYWDAGYTYWEGGDEGAGKHSLSFAP VFVYEFAGDSIKPFIEAGIGVAAFSGTRVGDQNLGSSLNFEDR
c = "MALLPAAPGAPARATPTRWPVGCFNRPWTKWSYDEALDGIKAAGYAWTGLLTASKPSLHHATATPEY LAALKQKSRHAA".replace(" ", '')

def comp(a):
    return {x : a.count(x)/len(a) for x in set(aas)}
def hamm(a,b):
    d1 = comp(a)
    d2 = comp(b)
    return sum([abs(d1[x]-d2[x]) for x in aas])
def euclidean(a,b):
    d1 = comp(a)
    d2 = comp(b)
    return sum([(d1[x] - d2[x])**2 for x in aas])**0.5

eu = [euclidean(x,y) for x,y in [(a,b),(b,c),(c,a)]]
ha = [hamm(x,y) for x,y in [(a,b),(b,c),(c,a)]]
df = pd.DataFrame([eu,ha], index = ['Euclidean', "Hamming"], columns = ['1,2','2,3','1,3'])
df
```

Out[16]:

	1,2	2,3	1,3
Euclidean	0.201062	0.201130	0.220868
Hamming	0.665728	0.726633	0.843354

Question 2

703 Reviewed sequences from uniprot were taken



In [21]:
```
pd.DataFrame(np.transpose([[245,304,430,504,639]]),index = [0.4,0.5,0.75,0.9,1], columns = ["Number of Clusters"])
```

Out[21]:

	Number of Clusters
0.40	245
0.50	304
0.75	430
0.90	504
1.00	639

Header of each file in CD-HIT Cluster is attached

Raw output
Download all files
Browse clusters by size
Browse clusters by length
Distribution of clusters

```
>Cluster 0
0       810aa, >sp|P0A940|BAMA_ECOLI... at 78.77%
1       803aa, >sp|B5F8T8|BAMA_SALA4... at 79.83%
2       810aa, >sp|A9MPI4|BAMA_SALAR... at 79.01%
3       810aa, >sp|B5Z0F6|BAMA_ECO5E... at 78.77%
4       810aa, >sp|B7MP37|BAMA_ECO81... at 78.64%
5       797aa, >sp|P46024|BAMA1_HAEIF... at 45.17%
6       810aa, >sp|B7MBF8|BAMA_ECO45... at 78.77%
7       810aa, >sp|P0A942|BAMA_ECO57... at 78.77%
8       809aa, >sp|B5Y1J4|BAMA_KLEP3... at 78.86%
9       809aa, >sp|A6T4X9|BAMA_KLEP7... at 79.23%
10      814aa, >sp|Q6D8D5|BAMA_PECAS... *
11      805aa, >sp|Q57T31|BAMA_SALCH... at 78.88%
12      810aa, >sp|B7LGN8|BAMA_ECO55... at 78.77%
13      810aa, >sp|B7M1Y0|BAMA_ECO8A... at 78.77%
14      809aa, >sp|C6DAJ1|BAMA_PECCP... at 96.42%
15      793aa, >sp|O32629|BAMA2_HAEIF... at 41.99%
16      797aa, >sp|Q7N8N9|BAMA_PHOLL... at 76.16%
17      797aa, >sp|Q9S341|BAMA_PHOLU... at 75.91%
18      810aa, >sp|A7ZHR7|BAMA_ECO24... at 78.77%
19      810aa, >sp|C4ZRR9|BAMA_ECOBW... at 78.77%
20      810aa, >sp|B1XD46|BAMA_ECODH... at 78.77%
21      810aa, >sp|B1LGX9|BAMA_ECOSM... at 78.77%
22      810aa, >sp|Q1RG12|BAMA_ECOUT... at 78.77%
23      802aa, >sp|B7LW74|BAMA_ESCF3... at 79.55%
24      805aa, >sp|C0Q6K0|BAMA_SALPC... at 79.01%
25      803aa, >sp|Q8Z9A3|BAMA_SALTI... at 79.70%
26      810aa, >sp|Q32JT2|BAMA_SHIDS... at 78.77%
27      810aa, >sp|Q0T832|BAMA_SHIF8... at 78.77%
28      810aa, >sp|P0A943|BAMA_SHIFL... at 78.77%
29      810aa, >sp|Q3Z5I1|BAMA_SHISS... at 78.77%
30      808aa, >sp|Q2NRL5|BAMA_SODGM... at 81.56%
31      795aa, >sp|A7FFH7|BAMA_YERP3... at 81.76%
32      795aa, >sp|Q1CAM6|BAMA_YERPA... at 81.76%
33      795aa, >sp|B2JZ26|BAMA_YERPB... at 81.76%
34      795aa, >sp|Q8ZH58|BAMA_YERPE... at 81.76%
35      795aa, >sp|Q667J7|BAMA_YERPS... at 81.76%
36      810aa, >sp|B7UIM2|BAMA_ECO27... at 78.77%
37      795aa, >sp|C5B7R5|BAMA_EDWI9... at 78.49%
38      805aa, >sp|A4W6S2|BAMA_ENT38... at 80.12%
```

Raw output
Download all files
Browse clusters by size
Browse clusters by length
Distribution of clusters

```
>Cluster 0
0       810aa, >sp|P0A940|BAMA_ECOLI... at 78.77%
1       803aa, >sp|B5F8T8|BAMA_SALA4... at 79.83%
2       810aa, >sp|A9MPI4|BAMA_SALAR... at 79.01%
3       810aa, >sp|B5Z0F6|BAMA_ECO5E... at 78.77%
4       810aa, >sp|B7MP37|BAMA_ECO81... at 78.64%
5       810aa, >sp|B7MBF8|BAMA_ECO45... at 78.77%
6       810aa, >sp|P0A942|BAMA_ECO57... at 78.77%
7       809aa, >sp|B5Y1J4|BAMA_KLEP3... at 78.86%
8       809aa, >sp|A6T4X9|BAMA_KLEP7... at 79.23%
9       814aa, >sp|Q6D8D5|BAMA_PECAS... *
10      805aa, >sp|Q57T31|BAMA_SALCH... at 78.88%
11      810aa, >sp|B7LGN8|BAMA_ECO55... at 78.77%
12      810aa, >sp|B7M1Y0|BAMA_ECO8A... at 78.77%
13      809aa, >sp|C6DAJ1|BAMA_PECCP... at 96.42%
14      797aa, >sp|Q7N8N9|BAMA_PHOLL... at 76.16%
15      797aa, >sp|Q9S341|BAMA_PHOLU... at 75.91%
16      810aa, >sp|A7ZHR7|BAMA_ECO24... at 78.77%
17      810aa, >sp|C4ZRR9|BAMA_ECOBW... at 78.77%
18      810aa, >sp|B1XD46|BAMA_ECODH... at 78.77%
19      810aa, >sp|B1LGX9|BAMA_ECOSM... at 78.77%
20      810aa, >sp|Q1RG12|BAMA_ECOUT... at 78.77%
21      802aa, >sp|B7LW74|BAMA_ESCF3... at 79.55%
22      805aa, >sp|C0Q6K0|BAMA_SALPC... at 79.01%
23      803aa, >sp|Q8Z9A3|BAMA_SALTI... at 79.70%
24      810aa, >sp|Q32JT2|BAMA_SHIDS... at 78.77%
25      810aa, >sp|Q0T832|BAMA_SHIF8... at 78.77%
26      810aa, >sp|P0A943|BAMA_SHIFL... at 78.77%
27      810aa, >sp|Q3Z5I1|BAMA_SHISS... at 78.77%
28      808aa, >sp|Q2NRL5|BAMA_SODGM... at 81.56%
29      795aa, >sp|A7FFH7|BAMA_YERP3... at 81.76%
30      795aa, >sp|Q1CAM6|BAMA_YERPA... at 81.76%
31      795aa, >sp|B2JZ26|BAMA_YERPB... at 81.76%
32      795aa, >sp|Q8ZH58|BAMA_YERPE... at 81.76%
33      795aa, >sp|Q667J7|BAMA_YERPS... at 81.76%
34      810aa, >sp|B7UIM2|BAMA_ECO27... at 78.77%
35      795aa, >sp|C5B7R5|BAMA_EDWI9... at 78.49%
36      805aa, >sp|A4W6S2|BAMA_ENT38... at 80.12%
37      810aa, >sp|B4SV06|BAMA_SALNS... at 79.38%
38      803aa, >sp|Q5PD65|BAMA_SALPA... at 79.70%
```

Raw output
Download all files
Browse clusters by size
Browse clusters by length
Distribution of clusters

```
>Cluster 0
0       810aa, >sp|P0A940|BAMA_ECOLI... *
1       803aa, >sp|B5F8T8|BAMA_SALA4... at 93.52%
2       810aa, >sp|A9MPI4|BAMA_SALAR... at 95.93%
3       810aa, >sp|B5Z0F6|BAMA_ECO5E... at 100.00%
4       810aa, >sp|B7MP37|BAMA_ECO81... at 99.88%
5       810aa, >sp|B7MBF8|BAMA_ECO45... at 100.00%
6       810aa, >sp|P0A942|BAMA_ECO57... at 100.00%
7       809aa, >sp|B5Y1J4|BAMA_KLEP3... at 91.47%
8       809aa, >sp|A6T4X9|BAMA_KLEP7... at 91.59%
9       805aa, >sp|Q57T31|BAMA_SALCH... at 93.54%
10      810aa, >sp|B7LGN8|BAMA_ECO55... at 100.00%
11      810aa, >sp|B7M1Y0|BAMA_ECO8A... at 100.00%
12      810aa, >sp|A7ZHR7|BAMA_ECO24... at 100.00%
13      810aa, >sp|C4ZRR9|BAMA_ECOBW... at 100.00%
14      810aa, >sp|B1XD46|BAMA_ECODH... at 100.00%
15      810aa, >sp|B1LGX9|BAMA_ECOSM... at 98.89%
16      810aa, >sp|Q1RG12|BAMA_ECOUT... at 100.00%
17      802aa, >sp|B7LW74|BAMA_ESCF3... at 93.77%
18      805aa, >sp|C0Q6K0|BAMA_SALPC... at 93.66%
19      803aa, >sp|Q8Z9A3|BAMA_SALTI... at 93.90%
20      810aa, >sp|Q32JT2|BAMA_SHIDS... at 99.75%
21      810aa, >sp|Q0T832|BAMA_SHIF8... at 100.00%
22      810aa, >sp|P0A943|BAMA_SHIFL... at 100.00%
23      810aa, >sp|Q3Z5I1|BAMA_SHISS... at 100.00%
24      810aa, >sp|B7UIM2|BAMA_ECO27... at 100.00%
25      810aa, >sp|B4SV06|BAMA_SALNS... at 95.31%
26      803aa, >sp|Q5PD65|BAMA_SALPA... at 93.77%
27      810aa, >sp|B2U320|BAMA_SHIB3... at 100.00%
28      810aa, >sp|Q325W3|BAMA_SHIBS... at 100.00%
29      810aa, >sp|A7ZWC3|BAMA_ECOHS... at 100.00%
30      810aa, >sp|A1A7M1|BAMA_ECOK1... at 99.88%
31      810aa, >sp|Q0TLF6|BAMA_ECOL5... at 100.00%
32      810aa, >sp|P0A941|BAMA_ECOL6... at 100.00%
33      810aa, >sp|B1IQG4|BAMA_ECOLC... at 100.00%
34      810aa, >sp|B7N844|BAMA_ECOLU... at 100.00%
35      810aa, >sp|B6HZF1|BAMA_ECOSE... at 100.00%
36      804aa, >sp|B5FJ24|BAMA_SALDC... at 93.78%
37      804aa, >sp|B5R3J0|BAMA_SALEP... at 93.78%
38      810aa, >sp|B5RHG2|BAMA_SALG2... at 95.31%
```

Question 3 and 4

Since Pisces server is down, these questions could not be done. Instead the comaparision is done between uniport and CD-HIT at cutoffs in question 5

Question 5

In [25]:
```
pd.DataFrame(np.transpose([[245,304,430,504,639],['-',365,'-',542,640]]),index = [0.4,0.5,0.75,0.9,1], columns = [
```

Out[25]:

	Number of Clusters in CD-HIT	Number of Clusters in Uniprot
0.40	245	-
0.50	304	365
0.75	430	-
0.90	504	542
1.00	639	640