

Q3

Provide two examples to show that we can't enforce Sufficiency and Separation at the same time.
Rounded to 6 decimals

Ex 1: Separation holds but not sufficiency

```

291     print(" #####          SEPERATED          #####")
292     for yeet in ['YES', 'NO']:
293         for gender in ["Male", "Female"]:
294             gd.set_evidence(gender)
295             hl.set_evidence(yeet)
296             query1 = VE(medical, co, [hl])
297             query2 = VE(medical, co, [hl, gd])
298
299             for i in [0, 1]:
300                 print(round(query1[i],6), round(query2[i],6))
301
302     print(" #####          BUT NOT SUFFICIENT          #####")
303     for yeet in ['YES', 'NO']:
304         for gender in ["Male", "Female"]:
305             gd.set_evidence(gender)
306             co.set_evidence(yeet)
307             query1 = VE(medical, hl, [co])
308             query2 = VE(medical, hl, [co, gd])
309
310             for i in [0, 1]:
311                 print(round(query1[i],6), round(query2[i],6))
312

```

PROBLEMS 21 OUTPUT TERMINAL DEBUG CONSOLE

```

#####          SEPERATED          #####
0.787694 0.787694
0.212306 0.212306
0.787694 0.787694
0.212306 0.212306
0.583204 0.583204
0.416796 0.416796
0.583204 0.583204
0.416796 0.416796
#####          BUT NOT SUFFICIENT          #####
0.479071 0.515268
0.520929 0.484732
0.479071 0.438108
0.520929 0.561892
0.257518 0.286171
0.742482 0.713829
0.257518 0.227235
0.742482 0.772765

```

Ex 2: Sufficiency holds but not separation

```

314 print(" ##### NOT SEPERATED #####")
315 for yeet in ['YES', 'NO']:
316     for gender in ["Male", "Female"]:
317         gd.set_evidence(gender)
318         co.set_evidence(yeet)
319         query1 = VE(medical, hl, [co])
320         query2 = VE(medical, hl, [co, gd])
321
322         for i in [0, 1]:
323             print(round(query1[i],6), round(query2[i],6))
324
325 print(" ##### SUFFICIENT #####")
326 for yeet in ['YES', 'NO']:
327     for gender in ["Male", "Female"]:
328         gd.set_evidence(gender)
329         hl.set_evidence(yeet)
330         query1 = VE(medical, co, [hl])
331         query2 = VE(medical, co, [hl, gd])
332         # query2 = VE(medical, co, [hl, vg])
333         # query2 = VE(medical, co, [hl, ac])
334         # query2 = VE(medical, co, [hl, ag])
335
336         for i in [0, 1]:
337             print(round(query1[i],6), round(query2[i],6))

```

PROBLEMS 21 OUTPUT TERMINAL DEBUG CONSOLE

```

##### NOT SEPERATED #####
0.479071 0.515268
0.520929 0.484732
0.479071 0.438108
0.520929 0.561892
0.257518 0.286171
0.742482 0.713829
0.257518 0.227235
0.742482 0.772765
##### SUFFICIENT #####
0.787694 0.787694
0.212306 0.212306
0.787694 0.787694
0.212306 0.212306
0.583204 0.583204
0.416796 0.416796
0.583204 0.583204
0.416796 0.416796

```

Because of these two examples we can conclude we cant enforce sufficiency and separation at the same time.