1. Naïve Bayes
2. It is not likely to be true because they are most likely related in spam emails. If “viagra” is in the email, then the probability of “free” being in it increases; vice versa too. Mathematically, (whether and are independent or dependent), and because of what we said, so , where and are the existence of these two words.
3. . For every word of the words, we need to calculate two things – and , thus the . We also need to calculate , thus the .
4. . Not assuming independence requires us to keep track of both cases of for each of the words. thus has possibilities for each . However, the sum of all these possibilities for each is , so we can just do minus the sum of the previous to get the last . That makes calculations for each . We need to do this for both spam and not spam. That’s . We still need to compute once. .
5. Naïve Bayes has a much smaller runtime and is often good enough.
6. because .

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**Non-spam**

1. .

. **Spam**.

1. The intuition behind the in the denominator is that we start out as if all classes are equally likely , and there are such classes, spam and not spam.
2. Logic

|  |  |
| --- | --- |
| Predicate | True or False? |
| Overlap(Open Sky, MidCo) | F |
| Overlap(SpecCom, FiveCo) | T |
| Overlap(EastCom, MidCo) | T |
| Overlap(MidCo, MidCo) | F |
| Overlap(Central, MidCo) | T |

* 1. ^
  2. If two networks overlap, then they cannot use the same channel.
  3. **.**
  4. Yes, it’s satisfiable:

Open Sky: 1  
SpecCom: 1  
Central: 3  
FiveCo: 2  
MidCo: 1  
EastCom: 2

* 1. No, it’s not satisfiable. If Open Sky, SpecCom, and EastCom all take channel 1, then that leaves all three of FiveCo, MidCo, and Central to choose between channels 2 and 3, but that’s only two channels for three overlapping networks.

1. CNF and Resolution
   1. converted to CNF is

|  |  |
| --- | --- |
| Statement | Value |
| HasChannel(Open Sky, ) | T |
| HasChannel(Open Sky, ) | F |
| HasChannel(Open Sky, ) | F |
| Overlap(Open Sky, Central) | T |

* 1. ^
  2. ??

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()

* 1. Conversion to CNF

Open Sky cannot both overlap with Central and not overlap with Central.

Central cannot both have channel 1 and not have channel 1.

Open Sky cannot both have channel 1 and not have channel 1.