CS 315 - Day 02, AI and Graph Theory

Today you will be forming two different groups, so you will be moving twice.

Handout the gerald + donald = robert puzzle, and work on individually.

In-class w/ ***NEW* *assigned groups of four (4)***, write 0. and 1. on board as ground rule(s):

0. No devices.
1. Intro: Name, POE, Icebreaker.
2. Pick someone on the group who will report out.
3. Discuss the gerald + donald = robert puzzle. Did anyone solve it?

===== Report out the puzzle =====

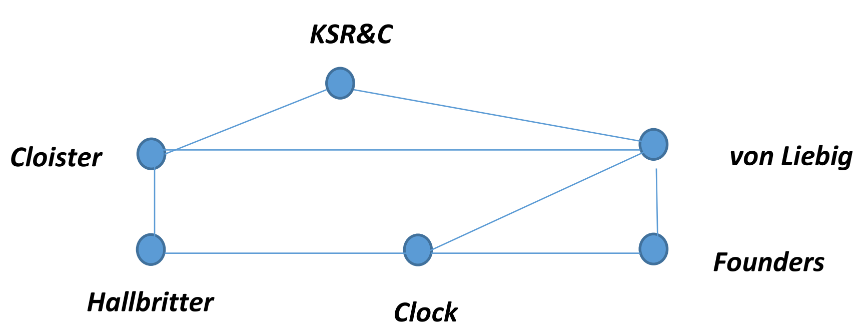
4. Devices allowed. Prompt your favorite AI to solve the problem. Was it right? If not, did you try to refine the prompt?

===== Report out the AI response =====

5. Google this puzzle. Try switching the order, donald + gerald = Robert

Here's a portion of a map of the Juniata Campus:

Let's represent with a ***graph***, where the nodes are buildings/structures and the edges are walkways connecting buildings/structures.



Can you take a walk, starting and ending at the same node, using each edge (sidewalk) once?

Can you take a walk, starting and ending at a ***different*** node, using each edge (sidewalk) once?

Can you take a walk, starting and ending at the same node, using each edge (sidewalk) once?

No, but why not?

Can you take a walk, starting and ending at a ***different*** node, using each edge (sidewalk) once?

Yes, Clock → vLB → Founders → Clock → Halbritter → Cloister → vLB → KSR&C → Cloister

What is special about the Clock node and Cloister node compared to the other nodes?

It seems that the degree of the vertices matter. To get a circuit, stopping and starting at the same node, vertices of even degree are required. And the Clock and Cloister nodes have an odd degree, so they could be the starting and stopping nodes in a Trail (not a Circuit).

The problem here is a Juniata-specific version of the first published graph theory problem, from the great mathematician Euler, on why it wasn't possible for a person in Königsberg to take a walk around town, starting and ending at the same location and crossing each of the seven bridges in the town exactly once.

https://x.com/Anthony_Bonato/status/1890515933157896287

Handout the **Secret Santa** puzzle, and work on individually.

<u>In-class w/ ***NEW assigned groups of four (4)***, write 0. and 1. on board as ground rule(s):</u>

0. No devices.
1. Intro: Name, POE, Icebreaker.
2. Pick someone on the group who will report out.
3. Discuss the **Secret Santa** puzzle. Did anyone get a solution?

===== Report out the puzzle =====

4. ***Devices allowed.*** Prompt your favorite AI to solve the problem. Was it right? If not, did you try to refine the prompt?

===== Report out the AI response =====

```
    g e r a l d
+   d o n a l d
---------------
    r o b e r t
```

0. d = 5

```
    g e r a l 5
+   5 o n a l 5
---------------
    r o b e r t
```

1. t = 0, and a carry to the l col.

```
    g e r a l 5
+   5 o n a l 5
---------------
    r o b e r 0
```

2. e has to be 9, with a carry, since t is already 0 and the sum gives letter o.

```
    g 9 r a l 5
+   5 o n a l 5
---------------
    r o b 9 r 0
```

3. r has to be odd, 2*l+1, and bigger than 5. 9 already taken, so it is 7, and which makes l=8

```
    g 9 7 a 8 5
+   5 o n a 8 5
---------------
    7 o b 9 7 0
```

4. with the carry, a has to be 4.

```
     g 9 7 4 8 5
+    5 o n 4 8 5
-----------------
     7 o b 9 7 0
```

5. n has to be large enough for a carry, and the only digit left is 6, and so b =3.

```
     g 9 7 4 8 5
+    5 o 6 4 8 5
-----------------
     7 o 3 9 7 0
```

6. the carry plus 9 will send a carry to the rightmost column, so g=1 and o=2.

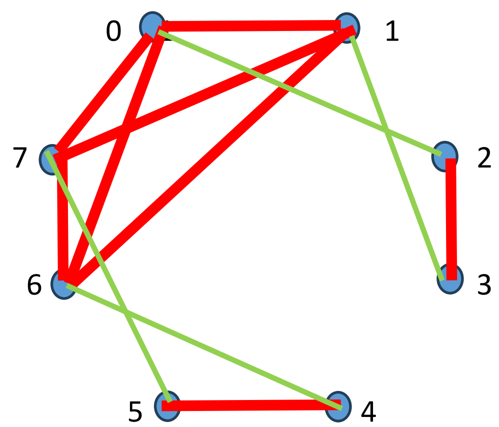
```
     1 9 7 4 8 5
+    5 2 6 4 8 5
-----------------
     7 2 3 9 7 0
```

a = 4
b = 3
d = 5
e = 9
g = 1
l = 8
n = 6
o = 2
r = 7
t = 0

8 people are doing secret Santa. Persons 0 & 1 cannot get each other, persons 2 & 3 cannot get each other, persons 4 & 5 cannot get each other, and persons 6 & 7 cannot get each other.

In addition, both persons 0 & 1 cannot get either persons 6 & 7 and vice versa.

Find ***<u>one combination</u>*** that works. The red edges below are not allowed. The green edges below are one combination that works.



Enter the above prompt into your favorite AI. Is the result correct?

Ask your AI for how many total working combinations there are.

Ask your AI for all of the actual working combinations.