1 *created by Roger B., Cryptanalytic Mathematician, NSA*

Nadine is having a party, and she has invited three friends – Aaron, Doug, and Maura. The three of them make the following statements on the days leading up to the party:

Two Days Before the Party:
Aaron: Doug is going to the party.
Doug: Maura is not going to the party.
Maura: Aaron will go to the party if, and only if, I do.

The Day Before the Party:
Aaron: Maura will go to the party if, and only if, I don't go.
Doug: An even number out of the three of us are going to the party.
Maura: Aaron is going to the party.

The Day of the Party:
Aaron: It is not yet 2018.
Doug: Aaron will go to the party if, and only if, I do.
Maura: At least one of the three of us is not going to the party.

Nadine also knows that out of Aaron, Doug, and Maura:
One of them never lies.
A different one of them lies on days of the month that are divisible by 2, but is otherwise truthful.
The remaining one of them lies on days of the month that are divisible by 3, but is otherwise truthful.

1. Can you figure out who is going to attend?
2. Can you figure out on what day, month, and year the party will be held, assuming it takes place in the future?

2 *created by Stephen C., Cryptanalytic Mathematician, NSA*

After observing Albert and Bernard determine Cheryl's birthday, Charlie decides he wants to play. He presents a list of 14 possible dates for his birthday to Albert, Bernard and Cheryl.

Apr 14, 1999	Apr 15, 2000	May 14, 2001
Feb 19, 2000	Feb 15, 2001	May 16, 2001
Mar 14, 2000	Mar 15, 2001	May 17, 2001
Mar 15, 2000	Apr 14, 2001	Feb 17, 2002
Apr 16, 2000	Apr 16, 2001	

He then announces that he is going to tell Albert the month, Bernard the day, and Cheryl the year.
After he tells them, Albert says, "I don't know Charlie's birthday, but neither does Bernard."
Bernard then says, "That is true, but Cheryl also does not know Charlie's birthday."
Cheryl says, "Yes and Albert still has not figured out Charlie's birthday."
Bernard then replies, "Well, now I know his birthday."
At this point, Albert says, "Yes, we all know it now."
What is Charlie's birthday?

The chief detective hurried down to the police station after hearing big news: there was a heist at Pi National Bank! The police had brought in seven known gang members seen leaving the scene of the crime. They belonged to the nefarious True/False Gang, so named because each member is either required to always tell the truth or required to always lie, although everyone is capable of engaging in wrongdoing. The chief also knew from his past cases that any crime committed by the gang always included one truth teller.

When the chief showed up, he asked the gang members the following questions:

    1) Are you guilty?
    2) How many of the seven of you are guilty?
    3) How many of the seven of you tell the truth?

Here were their responses:

    Person 1: Yes; 1; 1
    Person 2: Yes; 3; 3
    Person 3: No; 2; 2
    Person 4: No; 4; 1
    Person 5: No; 3; 3
    Person 6: No; 3; 3
    Person 7: Yes; 2; 2

After looking these answers over, the chief prepared to arrest those responsible.
Which of these seven did the chief arrest?

Following their latest trip, the 13 pirates of the ship, SIGINTIA, gather at their favorite tavern to discuss how to divvy up their plunder of gold coins. After much debate, Captain Code Breaker says, "Argggg, it must be evenly distributed amongst all of us. Argggg." Hence, the captain begins to pass out the coins one by one as each pirate anxiously awaits her reward. However, when the captain gets close to the end of the pile, she realizes there are three extra coins.

After a brief silence, one of the pirates says, "I deserve an extra coin because I loaded the ship while the rest of you slept." Another pirate states, "Well, I should have an extra coin because I did all the cooking." Eventually, a brawl ensues over who should get the remaining three coins. The tavern keeper, annoyed by the chaos, kicks out a pirate who has broken a table and who is forced to return her coins. Then the tavern owner yells, "Keep the peace or all of you must go!"

The pirates return to their seats and the captain, left with only 12 total pirates, continues to distribute the coins â€" "one for you," "one for you." Now, as the pile is almost depleted, she realizes that there are five extra coins. Immediately, the pirates again argue over the five extra coins. The captain, fearing that they will be kicked out, grabs the angriest pirate and ushers her out of the tavern with no compensation. With only 11 pirates left, she resumes distribution. As the pile nears depletion, she sees that there won't be any extra coins. The captain breathes a sigh of relief. No arguments occur and everyone goes to bed in peace.

If there were less than 1,000 coins, how many did the pirates have to divvy up?

Visit Puzzle Periodical for Solutions

i) The attendees are Doug and Aaron. March 1, 2016. iv) Jun 2016: 341 coins.
iii) Nov 2016: The truth-tellers must be #2, #5, and #6; the chief should arrest #2, #3, and #4.
ii) Jul 2015: Charlie's birthday is Apr 16, 2000. Find More Puzzles at nsa.gov

The Puzzle Periodical