



Created by Ben E., Applied Research Mathematician, NSA

Kurt, a math professor, has to leave for a conference. At the airport, he realizes he forgot to find a substitute for the class he was teaching today! Before shutting his computer off for the flight, he sends an email: "Can one of you cover my class today? I'll bake a pie for whomever can do it." He sends the email to Julia, Michael, and Mary Ellen, his three closest friends in the math department, and boards the plane.

As Kurt is well-known for his delicious pies, Julia, Michael, and Mary Ellen are each eager to substitute for him. Julia, as department chair knows which class Kurt had to teach, but she doesn't know the time or building. Michael plays racquetball with Kurt so he knows what time Kurt teaches, but not the class or building. Mary Ellen helped Kurt secure a special projector for his class, so she knows what building Kurt's class is in, but not the actual class or the time.

Julia, Michael, and Mary Ellen get together to figure out which class it is, and they all agree that the first person to figure out which class it is gets to teach it (and get Kurt's pie). Unfortunately the college's servers are down, so Julia brings a master list of all math classes taught that day. After crossing off each of their own classes, they are left with the following possibilities:

- |                             |                              |
|-----------------------------|------------------------------|
| Calc 1 at 9 North Hall      | Calc 1 at 10 in South Hall   |
| Calc 2 at noon in West Hall | Calc 1 at 10 in North Hall   |
| Calc 1 at 3 in West Hall    | Calc 2 at 11 in East Hall    |
| Calc 1 at 10 in East Hall   | Calc 3 at noon in West Hall  |
| Calc 2 at 10 in North Hall  | Calc 2 at noon in South Hall |

After looking the list of over, Julia says, "Does anyone know which class it is? Michael and Mary Ellen immediately respond, "Well you don't." Julia asks, "Do you?" Michael and Mary Ellen both shake their heads, Julia then smiles and says, "I do now. I hope he bakes me a chocolate peanut butter pie."

Which class does Kurt need a substitute for?



Created by Paul H., Software Developer, NSA

Eddie, Layne, Kurt, and Chris are locked in a heated game of CyberChance which only one of them will win. Their fans are on the edge of their seats: everyone knows that in CyberChance, things can change at any moment. One fan, who prefers Kurt or Chris, is feeling worried since there is only a 4-in-10 chance that one of them will win. An Eddie fan brags that Eddie is twice as likely as Layne to come out on top. Another Eddie fan concurs, and adds the following observation: Chris is Eddie's main competition. He figures that, given that Chris doesn't win, Eddie has a 4-in-7 chance of winning. A Kurt fan had been quietly standing in the corner, listening to all the other fans, and wonders: What chance does Kurt have of winning CyberChance?



Created by Paul H., Software Developer, NSA

Four friends, Holly, Belle, Carol, and Nick gather for May birthdays. Holly announces that she has a game before dinner. She hid gifts for each of her friends inside three separate boxes secured with padlocks. She challenges her friends to figure out the combination without consulting each other.

She provides the following information. All the padlocks have the same combination. The padlocks use 3 digits from 0 to 9. She also tells them that the sum of the three digits is equal to nine, and every digit is equal to or greater than the previous digit. Holly tells each of her friends one of the digits in the combination. She states, "I've given the first digit to Belle, the second digit to Carol, and the third to Nick." The caveat is that the friends cannot share their numbers with each other or they will forfeit the gifts.

Then Holly gives her friends 30 minutes to open the padlocks while she watches and finishes dinner.

The three friends begin to think of the solution. One by one, they each try their hand at their padlock, but none of them opens the padlock. Seeing that no one has succeeded, suddenly Carol realizes she knows the answer, and successfully opens her box, revealing a new fitness tracker. Following this, Nick opens his padlock, revealing a new tablet; and Belle opens her box to find a new pair of headphones.

Having watched this entire event unfold, can you determine the correct combination?

*Hint: Belle knows her digit is a 1.*



Created by James M., Operations Researcher, NSA

48 ounces of coffee was divided between four mathematicians: Albert, Bianca, Carl, and Dmitri. Albert looked at the amounts in his colleagues' mugs and said, "I feel bad about taking this much coffee, as I've already had several cups today." Albert then poured an equal amount of coffee into each of the other three mugs until he had none left.

Bianca cried, "Now I have the same amount you did! This is too much for me – I'm trying to cut back, anyway." She then divided all of the coffee in her mug equally between the other three mugs.

Carl said, "Well now I have what Albert started with. There's no way I'm going to finish all of this." Then Carl shared all of his coffee equally among everyone else.

Dmitri, not wanting to seem greedy, shrugged and performed the same action. When Dmitri was finished, everyone was amazed to see they all had the same amount of coffee in their mug that they started with!

How much coffee did each mathematician have at the beginning?

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*! Calc 2 at 10 in North Hall. !!) Kurt has a measly 10% chance of winning. No wonder the kurt fan*  
*was sulking in the corner! !!!) 1,1,7 !v) Albert=24oz, Bianca=16oz, Carl=8oz, Dmitri=0oz*  
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