In front of you is a board with 20 switches, two positions each, and 100 bulbs, all off initially. Each of the switches changes the state of a subset of the 100 bulbs in a deterministic way, i.e., each consistently changes the state of a same set of bulbs every time. Furthermore, each bulb is connected to at least one switch, so that each bulb can be turned off or on (along with possibly others) by at least one switch. Prove they there is a configuration of the switches which will turn on at least 51 bulbs.

Please submit your solution to:

- Dr. Christian Avart, cavart@gsu.edu

before the deadline: March 31st, 7:00pm. The WINNER will be awarded with a $15 gift card, a certificate, and will be announced in the NEXT issue.

Solution to the February 2017 Problem of the Month

Let us write \( F_k \) for the outcome of the \( k \)-th toss, either \( H \) for Head or \( T \) for Tail. If your opponent wins after the \( k \)-th toss, this means that \( F_{k-2} = F_{k-1} = F_k = T \). Note that \( F_{k-3} \) is not \( T \) or your opponent would have won earlier. Note also that \( F_{k-3} \) is not \( H \) or you would have won. That means that \( k - 2 = 1 \), the first toss. Hence the only way for your opponent to win is if the first three tosses are Tails, and there is a 1/8 chance of that. In particular, you win with probability 7/8.

(Strictly speaking, one should also prove that someone will eventually win, but this seems intuitively clear. In fact, there’s a possibility that nobody would ever win, but the probability of that is zero. We might as well leave out this technical detail.)

Winner: Ryan Michael Thisleton.

Other correct submissions: Michael Jung, Ruoyi Chen, Jonathan Lopez, Ruben Izaguirre.