



DEPARTMENT OF MATHEMATICS

Math Club



Michigan Epsilon Chapter of Pi Mu Epsilon

Problem of the Fortnight

After taking a thrashing in the cryptocurrency market, selling it all, and using the proceeds to buy a week worth of groceries, you walk past an old man wearing strange clothing. “Magic get-rich-quick machine for sale,” he says. “For you, I will sell it for only one million dollars.” Sensing a great opportunity, you stop to listen. The machine has six boxes numbered 1–6, each of which starts with one dollar in it. The machine also has two levers.

Lever A: pulling this lever allows you to choose a box j from 1 to 5, remove one dollar from it (the chosen box must have a dollar in it to do this), and then two dollars appear in box $j + 1$. For example you can remove one dollar from box 3 and then two dollars appear in box 4.

Lever B: pulling this lever allows you to choose a box j from 1 to 4, remove one dollar from box j , and swap the contents of boxes $j + 1$ and $j + 2$. There must already be a dollar in box j in order to pull this lever.

You are allowed to remove money from the machine, but you can never put in more money. Fortunately your father will gladly give you a small loan of one million dollars, but you will then have to repay him two million dollars. Is the machine worth buying? Explain.

Please turn in your solutions to Dr. Patrick Bennett, by noon on **Friday, February 15 2019**. Strive for clarity, neatness and legibility! Solutions may be turned into the Math Dept office in **3319 Everett Tower**. Please include your name and email address. Electronic submissions may be sent to **patrick.bennett@wmich.edu**. If you are currently taking a math class, please include the instructor’s name and the course number.

<http://www.wmich.edu/mathclub>