Problem of the Month

Problem 7: Sneaky Values

April 2026

Hint

1. Use the largest denominations first.
2. Using the largest denominations first may have worked for Question 1, but it does not give the correct answer here.
3. First find the smallest sneaky values for the denomination sets $(1, 5, 8), (1, 10, 18), (1, 5, 6)$, and $(1, 10, 11)$. To prove that your candidate sneaky values are indeed the smallest, it may help to prove the following statement: For a denomination set $(d_1, d_2, \ldots, d_k)$, if $v < d_3 + 2$, then v is not a sneaky value.
4. (a) Suppose $G(v) = (n_1, n_2, \ldots, n_k)$. See if you can find a formula for each of the n_i. You may have to define such a formula recursively.

   (b) Given a realisation $(n_1, n_2, \ldots, n_k)$ of $v - d_i$, how can you construct a realisation of v?

   (c) The statement given in the hint for Question 3 will be helpful here, as well as the previous two parts of this question. If you are unfamiliar with a proof by induction, it will be helpful to learn about it!
5. Question 4(c) shows that what at first glance appears to be an infinite search, is actually a finite search!