

Homework 6 - Math 574, Frank Thorne (thornef@mailbox.sc.edu)

Due Friday, March 2 at 5:00.

Problems 1-5 in Section 5.2 are good warmup induction problems. They are part of the “additional” problems in this set. Consider doing these first if you find these exercises difficult.

Core:

5.2: 6, 11, 12, 13, 14, 19.

5.3: 2, 5, 10, 18, 21, 34, 35.

5.4: 1, 5.

Additional:

5.2: 1-5, 7, 9.

5.3: 11, 19.

5.4: 4, 6.

Bonus:

1. (2 points) 5.3, 37.

2. (2 points) Find an integer N for which the following statement is true, and prove it. (You are not required to find the smallest possible N .)

If you only have coins worth 10 cents and 13 cents, then for any integer $n \geq N$, some combination of coins is worth exactly n cents.

3. (5 points - secret challenge!) For all m and $n \geq 0$, define a function $F(m, n)$ recursively as follows: If $m = 0$ then $F(m, n) = n + 1$. If $m > 0$ and $n = 0$ then $F(m, n) = F(m - 1, 1)$. If $m > 0$ and $n > 0$, then $F(m, n) = F(m - 1, F(m, n - 1))$.

As a warmup, show that $F(2, 3) = 9$ and $F(3, 2) = 29$.

The secret challenge: Can you write down $F(5, 5)$? If so, write it down as an ordinary number (in base 10). Prove all your claims.