Homework 6, Morally Due Tue Apr 3, 2018

1. (0 points) What is your name? Write it clearly. Staple your HW. Listen to the three three HAMILTON-type songs on the website and be prepared to comment on them.

2. (30 points) Let $c \in \mathsf{N}$. Find a function f such that the following holds, and prove it.

   For all c-colorings of $\binom{[f(n)]}{2}$ *there exists a homog set of size* n.

   SOLUTION TO PROBLEM TWO

   Omitted, will do in class.

   END OF SOLUTION TO PROBLEM TWO

3. (Extra Credit (so to impress me)) Find a function f such that the following holds:

   For all 2-colorings of $\binom{[\{n,n+1,\ldots,f(n)\}]}{2}$ *there exists a LARGE homog set.*

4. (40 points) Recall that in class we had two different proofs of the infinite 3-ary Ramsey (with 2 colors) and hence two different proofs of the finite 3-ary Ramsey. Let $c \in \mathsf{N}$.

   (a) For this problem use the proof of 3-ary Ramsey that uses 2-ary Ramsey many times and 1-ary Ramsey once: Find a function f such that the following holds, and prove it.

   For all c-colorings of $\binom{[f(n)]}{3}$ *there exists a homog set of size* n.

   (b) For this problem use the proof of 3-ary Ramsey that uses 1-ary Ramsey many times and 2-ary Ramsey once: Find a function f such that the following holds, and prove it.

   For all c-colorings of $\binom{[f(n)]}{3}$ *there exists a homog set of size* n.

   SOLUTION TO PROBLEM THREE

   Omitted- will do in class.

   END OF SOLUTION TO PROBLEM THREE

5. (Extra Credit (so to impress me)) Find a function f such that the following holds.

   For all 2-colorings of $\binom{[\{n,n+1,\ldots,f(n)\}]}{3}$ *there exists a LARGE homog set.*

6. (30 points) Let $a \in \mathsf{N}$, with $a \geq 3$. Find a function f such that the following holds, and prove it.

   For all 2-colorings of $\binom{[f(n)]}{a}$ *there exists a homog set of size* n.

   (You may need to use induction on a.)

   SOLUTION TO PROBLEM FOUR

   Omitted, will do in class.

   END OF SOLUTION TO PROBLEM FOUR

7. (Extra Credit (so to impress me)) Let $a \in \mathsf{N}$ with $a \geq 3$. Find a function f such that the following holds.

   For all 2-colorings of $\binom{[\{n,n+1,\ldots,f(n)\}]}{a}$ *there exists a LARGE homog set.*