

Homework 12

Morally Due Tue May 3 at 3:30PM. Dead Cat May 5 at 3:30

WARNING: THE HW IS TWO PAGES LONG

1. (0 points) What is your name? Write it clearly. When is the take-home final due?
2. (50 points) Let $VDW(k, c)$ be the statement
There exists $W = W(k, c)$ such that for all $\text{COL}: [W] \rightarrow [c]$ there exists $a, d \geq 1$ such that

$a, a + d, \dots, a + (k - 1)d$ are the same color .

Let $W(k, c)$ be as in the statement.

AND NOW FOR THE PROBLEM

Assume $(\forall c)[VDW(9, c)]$. Prove $VDW(10, 2)$. Your proof should give an upper bound on $W(10, 2)$ as a function of $W(9, c)$.

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3. (50 points) In this problem you will do PART of the proof of $(\forall k)[\text{PVDW}(x^2, x^2 + x, \dots, x^2 + kx)]$.
- (a) (20 points) State carefully the LEMMA that will imply $(\forall k)[\text{PVDW}(x^2, x^2 + x, \dots, x^2 + kx)]$.
 - (b) (30 points) Prove carefully the BASE CASE of that lemma.
 - (c) (0 points, but good for your enlightenment) Prove the Induction Step of the lemma.

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