

MAT 312/AMS 351: Applied Algebra

Homework Assignment 2

Written Assignment due before 11:30am, Thursday, 9/12

Please read Sections 1.4 and 1.5 before starting on the problem set.

Practice Problems (do not hand in; answers in the book): 1.4 1-4; 1.5 1,2

Written Assignment: 1.4 5,6,7; 1.5 3; Problem A (below)

Show your work; correct answers without explanation will receive no credit, unless noted otherwise

Please write your solutions legibly; the grader will disregard solutions that he does not find readily readable (you are encouraged to type up your solutions, especially if your handwriting is not absolutely immaculate). The problems on your solutions must appear in the assigned order; out-of-order problems will not be graded. All solutions must be stapled (no paper clips) and have your name (first name first), recitation number (R01 or R02), and HW number in the upper-right corner of the first page; otherwise, you may receive no credit.

NO late homework will be accepted
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Problem A

A museum has a collection of blue, green, and red chameleons. When two chameleons of different colors meet, they both turn into the third color (if a blue and green meet, for example, they both turn red). The collection initially contains B blue, G green, and R red chameleons (B, G, R are nonnegative integers).

(a) Suppose all chameleons eventually turn the same color. Show that

$$(B-G)(G-R)(R-B) = 0 \pmod{3}.$$

(b) Suppose the above condition holds. Show that there exist a sequence of meetings so that all chameleons eventually turn the same color.

Hint: try the chameleon game starting with some small numbers for B , G , and R and keeping track of each difference above.