Homework 6, Due Wed July 20, 2016

1. (0 points) What is your name? Write it clearly. STAPLE your HW.

2. (30 points) Find a value $n$ such that for all 3-colorings of the $4 \times n$ grid there is a monochromatic rectangle. Find a 3-coloring of the $4 \times 18$ that has no mono rectangles. YOUR GRID COLORING MUST BE READABLE OR YOU WILL GET ZERO POINTS.

3. (30 points) Find a value $n$ such that for all 4-colorings of the $5 \times n$ grid there is a monochromatic rectangle. YOUR VALUE OF $n$ MUST BE CLEARLY STATED. NO PROOF REQUIRED.

4. (40 points) 3 people want to split 8 muffins. Give a plan to split the 8 muffins into pieces and distribute pieces to the 3 people so that (1) everyone gets $\frac{8}{3}$ muffins, and (2) the smallest piece is of size $\frac{4}{9}$. YOUR SCHEME MUST BE EASY TO FOLLOW OR YOU WILL GET ZERO POINTS. Show that there is NO scheme that has its min piece BIGGER than $\frac{4}{9}$. (HINT: Any such scheme would cut each muffin into two pieces, so there are 16 pieces total.) YOUR PROOF MUST BE COHERENT OR YOU WILL GET ZERO POINTS.