Homework 02, Morally due Mon Feb 15, 9:00AM

Throughout this HW:

- Let $f(m, s)$ be the muffin function (from the talk Bill gave on Muffins).

- You CAN use the Floor-Ceiling Theorem. (Advice: Write a program for it.)

1. (0 points but if you miss the midterm that means you got this wrong retroactively and you will lose a lot of points). When is the midterm? By what day do you need to tell Dr. Gasarch that you cannot make the midterm (if you cannot and know ahead of time)?

2. (40 points-10 each) Prove the following: (You are allowed to say 'by the floor ceiling theorem' if its true, without any further elaboration.

   (a) $f(8, 7) \leq \frac{5}{14}$
   (b) $f(12, 7) \leq \frac{3}{7}$.
   (c) $f(18, 7) \leq \frac{3}{7}$.
   (d) $f(19, 7) \leq \frac{25}{56}$.

3. (30 points- 15 each) Show the following by giving a procedure.

   (a) $f(12, 7) \geq \frac{3}{7}$.
   (b) $f(18, 7) \geq \frac{3}{7}$.

4. (30 points) If you combine parts of problem 2 with all of problem 3 you get $f(12, 7) = \frac{3}{7}$ and $f(18, 7) = \frac{3}{7}$. FIND two more values of m (rel prime to 7) such that $f(m, 7) = \frac{3}{7}$. PROVE these equalities (this will involve showing both $f(m, 7) \leq \frac{3}{7}$ and $f(m, 7) \geq \frac{3}{7}$.