Math 235 - Dr. Miller - HW #6, Fall 2024 - **Due by 4pm on Friday, Oct. 11, 2024**

Because I don't want this assignment to impinge on the days we have off for Fall Break, it has fewer problems than usual.

1. Rigorously prove the propositions below, using direct "for all" proof and constructive "there exists" proof where possible.

   (a) Prop. - There exists an integer x such that for all integers y, $xy = 2y(x-1)$.

   (b) Prop. - For all $m \in \mathbf{Z}^+$, there exists $q \in \mathbf{Q}$ for which $(m+1)(q-1) = 3$.

   (c) Prop. - There exist $a, b \in \mathbf{Z}$ such that, for all $x \in \mathbf{R}$, $\frac{5x}{a} = x + \frac{b+11}{4}$.

2. Rigorously prove by contradiction:

   Prop. - For every trio of real numbers x, y, z whose sum exceeds 300, at least one of the addends is greater than 100.

3. Rigorously prove by any meaningful method:

   Proposition: Let $x \in \mathbf{R}$. Then $x = 0$ if and only if, for all $y \in \mathbf{R}$, $xy = x$.