FIRST PROBLEM SET
Math 5615H: Honors Analysis

Due W 13 September, 2017.

10 points each; total 60 points.

1. Prove that $\sqrt{10}$ and $\sqrt{5} - \sqrt{2}$ are **not rational numbers.**

2. Let A and B be bounded sets in $\mathbb{R}$. Consider the *algebraic sum* of A and B,

$$A + B := \{x \in \mathbb{R} : \quad x = a + b \text{ for some } a \in A \text{ and } b \in B\}.$$

   Show that $\sup(A + B) = \sup A + \sup B$.

3. Find $\sup A$, where $A := \{x \in \mathbb{R} : \quad x^2 < 4x - 3\}$.

4. Problem #4 on p. 22.

5. Represent the complex numbers
   $z = \frac{2+i}{2-i}$ and $w = \frac{4+3i}{3+4i}$
   in the standard form $z = a + bi$, $w = c + di$ with $a, b, c, d \in \mathbb{R}$.

6. Problem #13 on p. 23.