Extra Homework Due 10/20

1. Show that $\log_{10} 2$ is irrational.

2. Assume that $a, b, c, d \in \mathbb{Z}$ satisfy $\gcd(a, b) = \gcd(c, d) = 1$ and $b, d > 0$. Prove that if $\frac{a}{b} + \frac{c}{d} \in \mathbb{Z}$ then $b = d$.

3. Find all $a, b, c \in \mathbb{Z}$ with $a, b, c > 0$, $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} \in \mathbb{Z}$ and $\gcd(a, b) = \gcd(b, c) = 1$.

4. The usual price for a specific camera is \$99. A discount store sold a certain number of these cameras for \$8137. If they charged a fixed discounted integer price for each of them how many cameras did they sell?

5. Prove that $\sqrt{2} + \sqrt{3}$ is irrational.