Name ____ Discrete I, Quiz 5

1) Identify which of these functions are one-to-one and onto by CIRCLING the functions that are one-to-one and BOXING the ones that are onto.

(a) $f_1(x) = 2x + 3$ with domain $\mathbb{R}$ and codomain $\mathbb{R}$.

(b) $f_2(x) = 2x + 3$ with domain $\mathbb{Z}$ and codomain $\mathbb{Z}$.

(c) $f_3(x) = x^2$ with domain $\mathbb{R}$ and codomain $\mathbb{R}$.

(d) $f_4(x) = x^2$ with domain $\mathbb{Z}$ and codomain $\mathbb{Z}$.

(e) $f_5(x) = \lfloor x \rfloor$ with domain $\mathbb{R}$ and codomain $\mathbb{Z}$.

2) Define the numbers $c_0, c_1, c_2, c_3, c_4, \ldots$ via $c_0 = 1$ and $c_n = c_{\lfloor \frac{n}{3} \rfloor} + \frac{4}{3}$. Prove, using strong induction, that $c_n < 2n$ for all $n \geq 1$.