**Name:**_____

**NetID:**_____ **Lecture: A**

**Discussion: Monday & Wednesday 1:30 2:30**

(20 points) Recall that $F_n$ is the nth Fibonacci number, and these start with $F_0 = 0$, $F_1 = 1$. Use (strong) induction to prove the following claim:

Claim: $F_n < (5/3)^n$ for any natural number $n$.

Proof by induction on $n$.

**Base case(s)**:

**Inductive Hypothesis** [Be specific, don't just refer to "the claim"]:

**Rest of the inductive step**:

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(10 points) Suppose we have a function $F$ defined (for $n$ a power of 2) by

$$\begin{aligned} F(2) &= c \\ F(n) &= F(n/2) + n \text{ for } n \geq 4 \end{aligned}$$

Your partner has already figured out that

$$F(n) = F(n/2^k) + \sum_{i=0}^{k-1} n\frac{1}{2^i}$$

Finish finding the closed form for $F$. Show your work and simplify your answer.