CS 173, Fall 18 Examlet 8, Part A

Name:_____

NetID:_____ **Lecture: B**

Discussion: Friday 11 12 1 2 3 4

(20 points) Suppose that $f : \mathbb{Z}^+ \to \mathbb{Z}$ is defined by

$f(1) = 3 \qquad f(2) = 5$

$f(n) = 3f(n-1) - 2f(n-2)$ for all $n \geq 3$.

Use (strong) induction to prove that $f(n) = 2^n + 1$

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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Discussion: Friday 11 12 1 2 3 4

(20 points) Suppose that $f : \mathbb{N} \to \mathbb{Z}$ is defined by

$f(0) = f(1) = f(2) = 1$

$f(n) = f(n-1) + f(n-3)$, for all $n \geq 3$

Use (strong) induction to prove that $f(n) \geq \frac{1}{2}(\sqrt{2})^n$. You may use the fact that $\sqrt{2}$ is smaller than 1.5.

Proof by induction on n.

Base case(s):

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

Rest of the inductive step: