# HW #3

**Kerry Ojakian's CSI 35 Class**

**Due Date:** Tuesday March 17 (beginning of class)

**General Instructions:**

- Homework must be stapled, be relatively neat, and have your name on it. All work and answers should be on this sheet (except for the book problems).
- Use tutors, work with other students, but ... don't copy!

**The Assignment**

1. Section 5.2 (p. 362, 363). Strong induction: 3, 4, 10 (put on attached sheet).

2. We recursively define $g$ as follows: $g(1) = 1$ and $g(n+1) = (g(n))^2 + g(n)$. Evaluate the following

   (a) $g(2)$

   (b) $g(3)$

   (c) $g(4)$

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3. We recursively define $f$ as follows: $f(0) = 1$, $f(1) = 1$ and $f(n) = f(n-1) - f(n-2)$. Evaluate the following.

   (a) $f(1)$

   (b) $f(3)$

   (c) $f(5)$

   Can you describe $f$ without recursion?

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4. Let $g(n) = (-3)^n$, defined on integers $n \geq 1$. Find a recursive definition for $g$.

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5. Let $g$ be defined by recursion as follows: $g(2) = 3$ and $g(n) = 7g(n-1) - 2$. Write the definition of a Python function that takes one integer as input and returns the output of $g$ on that input.

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6. Consider the set $S$ defined by $14 \in S$ and $s + t \in S$ whenever $s \in S$ and $t \in S$. Show that every element of $S$ is even.

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7. Let $r$ be defined recursively by $r(1) = 3$, $r(2) = 5$ and $r(n+1) = r(n) + 4 \cdot r(n-1)$. Prove that $r(n)$, for $n \geq 1$ is always odd.

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