Assignment 7
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Problem 1:

$$\sum_{k=1}^{n}(2k-1)=n^2$$

when $n=1$

$$\sum_{k=1}^{1}(2k-1)=2-1=1$$

$n^2=1$

the equation is true

when $n=a+1$

$$\sum_{k=1}^{a+1}(2k-1)=\sum_{k=1}^{a}(2k-1)+2(a+1)-1$$

$$=a^2+2a+2-1$$

$$=a^2+2a+1$$

$$=(a+1)^2$$

$\therefore$ the equation is always true

Problem 2:

Assume that two propositional formula A & B has same number (respectively nA & nB) of left parentheses as right parentheses. Then $(A \vee B)$ has $nA + nB + 1$ pairs of parentheses. By the same method, we can prove that with combinations of other propositional formulas by $\wedge$ and $\neg$ are also have same number of left parentheses as right parentheses.

Problem 3:

$\because$ for all nonnegative x, $0 \le f(x) \le x$

$\therefore$ in the recursion, $x_n < x_{n-1}$

$\because f(0)=0$

$f(x_n)=0$, $x_n \geq 0$

$f(x_{n-1})=x_{n-1} > x_n$

$\therefore$ every x would gradually decrease during the recursion, and eventually reaches zero.