Computer Science 260

Assignment 6

Due October 26, 2016

1. Use mathematical induction to prove that $\sum_{i=0}^{n} i2^i = (n-1)2^{n+1} + 2$. (4 marks)

2. Let f_k be the kth fibonacci number. Use strong mathematical induction to prove that for $n \geq 3$ $f_n \geq (\frac{3}{2})^{n-2}$. (4 marks)

3. Given the loop

while $i \neq n$

$p := 3 \times f$
$f := p + f + 1$
$i := i + 1$

end while

with the precondition $\{n$ integer, $n \geq 0, j = 0, f = 1\}$
and the postcondition $\{f = \frac{4^{n+1}-1}{3}\}$

Prove the correctness of this loop with respect to its pre- and post-conditions using the loop invariant $\{I(k) : i = k$ and $f = \frac{4^{k+1}-1}{3}\}$ (6 marks)