hw3

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1 (27)

a.
induction
step1: prove S(0) is odd

S(0)=1 which is odd

step2: assume S(k) is odd which means S(k)=2k+1 (k >= 0)

step3: prove S(k+1) is odd
S(k+1) = 2k+3 ((k >= 0))
even + odd = odd
the statement that S(k+1) is odd get proved.
so, S(n) is an odd number for n>= 0
b.
induction
step1: prove S(4) < 6S(2)

17 < 18

step2: assume S(k) < 6S(k-2) k >= 4

step3: prove S(k+1) < 6S(k-1)
S(k+1) = 12S(k-2)+5S(k-3)
6S(k-1)=12S(k-2)+6S(k-3)

S(k+1) < 6S(k-1) get proved

so, S(n) < 6S(n-2) for n>= 4

2 (37)

S(0)=a
S(n)=S(n-1)+d (n >= 1)

3 (11)

From 1200, 1800, 2700, 4050:
we could derive S(n)=1.5*S(n-1) (n>= 2)

from S(n) = c*S(n-1) +g(n)
we could derive S(n) = 1200*(1.5^{n-1})

S(12) = 1200 *(1.5^{11}) = 103797

4 (16)

infection:
$S_0 = 14$
$S_n = 14 * 5^{n-1}$

T_n =-(3.5)*(1-5^n)

solution:
$S_0 = 1$
$S_n = 6^{n-1}$

T_n =-0.2*(1-6^n)

$T_{solution} > T_{infection}$
n=16

5 (additional problem)