**ECE369 hw3**

**Section 2.4**

**26.**

P(n): T(n) ≥ 2n for n ≥ 7.

I: P(7): T(7) = 2T(5) + 2 = 14 = 2 × 7.

P(n) is true for n = 7.

II: Assume P(n) is true for 7 ≤ r ≤ k.

T(r) ≥ 2r for 7 ≤ r ≤ k.

III: T(k+1) = 2T(k-1) + 2 = 2(2(k-1) + 2) + 2 = 4k + 2 > 2k + 2 ( Since k > 6 > 2)

So T(k+1) ≥ 2(k+1)

Therefore, P(n) is true for P(k+1)

Therefore, T(n) ≥ 2n for n ≥ 7.

**35.**

C (2) = C(0) C(1) + C(1)(0) = 2

C (3) = 1 \* 2 + 1\*1 + 2\*1 = 5

C (4) = 5 + 2+ 2 +5 = 14

**Section 2.5**

**16. A computer virus that spreads by way of e-mail messages is planted in 3 machines the first day. Each day, each infected machine from the day before infects 5 new machines. By the end of the second day, a software solution has been found to counteract the virus, and 1 machine is clean is clean at that point. Each day thereafter, 6 times as many machines are clean as were clean the day before. How many days will it be before the effects of the virus are completely gone?**

S(n) = 5S(n-1) – 6n-2

S(n) = 5n-1×3 - Σi=2n (5n/36 × (6/5)i)

S(n) = 5n-1×3 – 5n-1(1.2n-1 – 1)

Since S(n) < 0

5n-1×3 < 5n-1(1.2n-1 – 1)

3 < (1.2n-1 – 1)

1.2n-1 > 4

n-1 > log4/log1.2

n-1 > 7.6

n > 8.6

n = 9

Therefore, 9 days is the answer.

**38.**

c = 1, g(n) = n

From table 2.6 method 2:

T(n) = 1logn×3 + Σi=1logn 1logn – I × 2i

T(n) = 3 + (21 + 22 + … + 2logn)

T(n) = 3 + 2×2logn – 2

T(n) = 1 + 2n

**Section 2.6**

**16.**

T(n) = T(n-1) + n – 1

T(1) = 0

**17.**

c = 1, g(n) = n – 1

T(n) = 1n-1T(1) + Σi=1n 1n-i×(i – 1)

T(n) = 0 + 1 + 2 + … + n – 1

T(n) = n(n – 1)/2

**Additional Problems**

**A. Suppose that there are n = 2^k (i.e., 2 to the power of k) teams in an elimination tournament, where there are n/2 games in the first round, with the n/2 = 2^(k-1) winners playing in the second round and so on.**

(i) Develop a recurrence relation for the number of rounds in the tournament.

(ii) How many rounds will be there in this tournament when there are 32 teams?

1. F(n) = F(n/2) + 1 n ≥ 2

C = 1, F(1) = 0, g(n) = 1

F(32) = 1log(32)\*0 + Σi=1log(n) 1log(n)-i (1)

= 0 + Σi=15 15-i (1)

= 0 + log (32)

= 5