csc240 Assignment 7

Mohan Zhang

1002748716

NO OUTSIDE DISCUSSION

NO EXTRA MATERIAL CONSULTED

\* basic assumption:

def pt(n):

for k← 1 to n do:

print

the function pt(n) above print n times.

(a)

M(n) = 0 if n = 1

M(n) = n + n\*M(n-1) if n > 1

explanation: det( B, n) performs no operation when n = 1, so M(n) = 0 if n = 1. When n > 1, det( B, n) goes into a while loop that loops n times. Every loop ends up with a conditional sentence that perform multiplication once no matter what, and no inner loop performs multiplications. Then, it perform det(C, n-1), goes into another determinant calculation. So, M(n) = (1+M(n-1))n = n + n\*M(n-1)

A(n) = 0 if n = 1

A(n) = if n > 1

explanation: det( B, n) performs no operation when n = 1, so A(n) = 0 if n = 1. When n > 1, d ← 0 is the first assignment, then det( B, n) goes into a while loop that loops n times. Every loop ends up with a conditional sentence that perform assignment once and and calculates det( C, n-1), goes into another determinant calculation. The inner loop for i ← 1 to n – 1 performs to separate inner loop, which assign j from 1 to n-1 and assigns an element in matrix C to an element in matrix B, which takes 2(n-1) steps. Moreover, every loop, no matter it is inner loop or outer loop, it assigns the number of loop more steps. So, A(n) = 1 + n( 1+(n-1)(2(n-1)+1) + 1 + A(n-1)) =

(b)

lemma:

proof :

base case:

1. when n = 1, n! -1 = 0, 2n! – n = 1,

when n = 2, n! -1=1, 2n! – n = 2, M(n)=2,

constructor case:

2. let be arbitrary

3. Assume

(direct prove from 3)

5.(direct prove from 4)

6. (n+1)M(n) (direct prove from 3)

7. (n+1)M(n)+(n+1) (direct prove from 6)

8.(direct prove from 2, 6 and lemma)

9. For k = n+1,

10.

(direct prove from 5, 9)

11. (direct prove from 2, 8, 9)

12. (direct prove from 11, 12)

13.

(c)

lemma :

proof:

base case:

1.when n = 1,

constructor case:

2. let be arbitrary

3. Assume

4. (direct prove from 3)

5.+(direct prove from 4 and lemma)

6. for k = n+1, M(k)=+ (direct prove from 5)

7.

(d) -

lemma:

proof:

proof:

base case:

1.when n=1,

when n=2,

when n=3,

when n=4,

when n=5,

constructor case:

2. let be arbitrary

3. Assume

4.for k=n+1, (direct prove from 2 and lemma)

5.- (direct prove from 4)

6.(direct prove from 2, 5)

7.

So, there exist a constant u= 100