**Section 3.2**

14) a) no, O(x^2)

b) yes, O(x^3)

c) yes, O(x^3), you drop the lower order term.

d) no, O(x^4), you drop the lower order term.

e) no, O(3^x)

f) yes, O(x^3), you drop the constant.

20)

log(n+1) and log(n^2 + 1)

= log(n) = log(n^2)

=O(log(n)) = 2log(n)

=O(log(n))

22)

(1.5)^2 n^100 (logn)^3 sqrt(n)logn 10^n (n!)^2 n^99 + n^98

Largerst to smallest O(g(x))

(n!)^2 , 10^n , (1.5)^n , n^100 , n^99 + n^98 , sqrt(n)logn , (logn)^3

26)

1. (n^3 logn + n^2(logn)^2 + n^3 + n^2 logn) + (n^3 logn + n^3)

O(n^3 logn)

b)

(2^n + n^2)(n^3 + 3^n)

2^n n^3 + 6^n + n^5 + n^2 3^n

O(6^n)

c)

(n^n + n2^n + 5^n)(n! + 5^n)

N! n^n + n! n2^n + n! 5^n + 5^n n^n + 5^n n2^n + 25^n

O(n^n n!)

**Section 3.3**

2)

t:= 0

for( i:= 1 to n) n complexity

for( j:= 1 to n) n complexity

t:= t + i + j n^2

O(n^2)

4)

I := 1

T := 0

While i <= n 2^n complexity

T := t +1

I := 2i

O(logn)

**Section 2.4**

12)

An = -3An-1 + 4An-2

a) 0 = 0 + 0

An = 0 is a solution.

b) -3(1) + 4(1) = 1

An = 1 is a solution.

c) -3(-4^n-1) + 4(-4^n-2)

(-4^n-2) ( -3 (-4) + 4)

(-4^n-2) (16)

(-4^n-2) (-4)^2

(-4)^n

An = -4^n is a solution.

d) -3(2(-4)^n-1 +3) + 4(2(-4)^n-2 + 3)

(-4)^n-2 (-3(-8) +8) + (-3(3) + 4(3))

(-4)^n-2 (24+8) + (-9 +12)

(-4)^n-2 (32)+(3)

(-4)^n-2 2(-4)^n +3

An = 2(-4)^n +3

14)

1. An = 3

An = An-1

1. An = 2n

A0 = 2(0) = 0

A1 = 2(1) = 2 A0 + 2

A2 = 2(2) = 4 A1 + 2

An = An-1 + 2

1. An = 2n+3

A0 = 3

A1 = 5 A0 +2

A2 = 7 A1 + 2

A3 = 9 A2 + 2

An = An-1 + 2

1. An = 5^n

A0 = 1

A1 = 5 A0\*5

A2 = 25 A1\*5

A3 = 125 A2\*5

An = 5(An-1)

1. An = n^2

A0 = 0

A1 = 1 A0 + 2(n) -1

A2 = 4 A1 + 2(n) -1

A3 = 8

An = An-1 + 2(n) -1

1. An = n^2 + n

A0 = 0

A1 = 2

A2 = 6 2n + An-1

A3 = 12

An = 2n +An-1

1. An = n + (-1)^n

A0 = 1

A1 = A0-1

A2 = A1+3

A3 = A2 - 1

An = An-1 +3 if n is even

An-1 -1 if n is odd

1. An = n!

A0 = 1

A1 = 1

A2 = 2

A3 = 6

A4 = 24

An = nAn-1

22)a)

Starting salary of $50000

Every year there is a raise of $1000 plus 5%

A0 = 50000

A1 = (1.05)An-1 + 1000

An = (1.05)An-1 + 1000

b)

Joined in 2017, what will be salary in 2025?

A0 (2017) = 50000

A1 (2018) = 53500

A2 (2019) = 57175

A3 (2020) = 61033.75

A4 (2021) = 65085.44

A5 (2022) = 69339.71

A6 (2023) = 73806.69

A7 (2024) = 78497.03

A8 (2025) = 83421.88

32)

a) j=0 to 8 (1+(-1)^j)

0 -- 2

1 -- 0

2 -- 2

3 -- 0

4 -- 2

5 -- 0

6 -- 2

7 -- 0

8 -- 2

== 10

b)

j=0 to 8 (3^j - 2^j)

0 -- 0

1 -- 1

2 -- 5

3 -- 19

4 -- 65

5 -- 211

6 -- 665

7 -- 2059

8 -- 6305

== 9330

c)

j=0 to 8 (2\*3^j + 3\*2^j)

0 -- 5

1 -- 12

2 -- 30

3 -- 78

4 -- 210

5 -- 582

6 -- 1650

7 -- 4758

8 -- 13890

== 21215

d) j=0 to 8 (2^j+1 - 2^j)

0 -- 1

1 -- 2

2 -- 4

3 -- 8

4 -- 16

5 -- 32

6 -- 64

7 -- 128

8 -- 256

== 511