

## Assignment 1.1

1.  $4^n$

2.  $12n^6$

3.  $5n^2$

4.  $n \log_2 n$

5.  $k \log_2 n$  if  $n$  much bigger than  $k$

6.  $40 \log_4 n$

7.  $\log_4 n$

## Assignment 1.2

a)  $T(n) = n^2 + 400n + 5 \quad O(n^2) \text{ for } n \geq 400$

$$400x \leq x^2$$

$$0 \leq x^2 - 400x$$

$$0 \leq x(x - 400)$$

$$x \geq 400$$

$$b) T(n) = 67n + 3n \quad O(n)$$

$$c) 2n + 5n \log n + 100$$

$$5n \log n = 2n$$

$$\log n =$$

$$n = 10^{\frac{2}{5}}$$

$$O(n \log n) \text{ for } n > 10^{\frac{2}{5}}$$

$$d) O(n^2)$$

$$e) O(2^n)$$

$$f) O(n)$$

$$g) O(n)$$

Assignment 1.3

1)

- toGregorian :

$$1+2+4+3+4+2+3+1+3+4 = O(27)$$

$$\text{day} : O(27) \quad \text{year} : O(27)$$

$$\text{month} : O(27)$$

$$\text{month Name} : 1+27+1 = O(29)$$

$$\text{dayOf Week} : 27+1+1+1+12 = O(42)$$

$$\text{advanceBy} : 1+1+1 = O(3)$$

$$\text{isLeapYear} : 2+2+2 = O(6)$$

is Valid Gregorian:

$$1+1+4+1+6+1 = O(14)$$

printCalendar :

Date. --init--



$$29+27+2+2+1+27+27+14+1+2+18+$$

$$1+1+7(2)+31(1+2+2+3)+1 = \underline{O(415)}$$

Costant time  $\sim$   
(slightly change with  
the month it's printing)

2)

is Subset Of :

$n :=$  size of subset A

$n/m$

$m := \text{size of subset D}$

is Proper Subset Of:

$nm + 2$

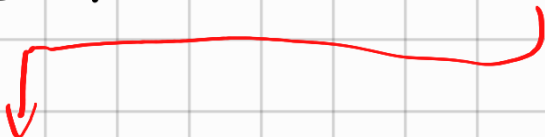
$O(nm)$  if  $n \sim m$   $O(n^2)$

Linear but it  $nm$  can be Quadratic.

3) insert()

0	1	2
a	b	c

I want to insert 'z' in position 0



0	1	2	3
	a	b	c

a → b → c

n shifts  $O(n)$

0	1	2	3
z	a	b	c

remove()

0	1	2	3
z			

I want to remove 'z'

2	a	b	c
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0	1	2	3
	a	b	c

0	1	2
a	b	c



$n$  shifts  $O(n)$

Assignment 1.4

a)  $O(n)$

b) Best case  $O(1)$

Worst case  $O(2 \log_2(n))$

c) Best case:  $n(2 + 5(1)) = 2n + 5n = O(7n)$

Worst case:  $n(2 + 5(2)) = 2n + 10n = O(12n)$

Worst case :  $n(4+n(1)) = 4n+n^2 = O(n^2)$

