

Assignment 4

Ex 1. Give $\Theta(+cn)$ est. w/ ^{simpl.} poss. $t(n)$
 $3n^2 + 5n \log n = \Theta(n^2)$

1. $13n^2 - 2n + 56 = \Theta(n^2)$

2. $2.5 \log n + 2 = \Theta(\log n)$

3. $n(12 + \log(n)) = \Theta(n \log n)$
 $12n + n \log n$
 \uparrow linear \uparrow log-linear

4. $1 + 2 + 3 + \dots + 2n = \Theta(n^2)$
 $= \frac{n(n+1)}{2} \rightarrow \frac{2n(2n+1)}{2} = \frac{4n^2 + 2n}{2} = \frac{2(2n^2 + n)}{2}$
 $= 2n^2 + n = \Theta(n^2)$

The sum of the first n natural numbers

5. $1 + 2 + 3 + \dots + n^2 = \Theta(n^4)$
 $\rightarrow \frac{n(n+1)}{2} = \frac{n^2(n^2+1)}{2} = \frac{n^4 + n^2}{2}$
 $= n^4 + n^2 = \Theta(n^4)$

6. $\log(n^3) + 10 = \Theta(\log n)$
 $\log(a^n) = n \log a$
 $\log(n^3) = 3 \log n = \Theta(\log n)$

7. $\log(n^3) + n \log n = \Theta(n \log n)$
 \uparrow log \uparrow log linear

8. $n \log(n^3) + n \log n = n \log n + n \log n = 2(n \log n) = \Theta(n \log n)$

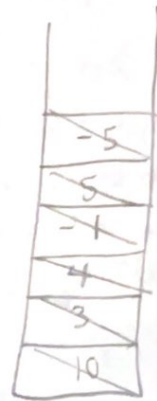
n. $3 \log n$

9. $2^{2 \log n} + 5n + 1 = 2^{2 \log n} = 2^{\log n^2} = 2^{\log n^2} = 2^{\log n^2} = n^2 = \Theta(n^2)$
 $= 2^{\log n} \cdot 2^{\log n} = 2(2^{\log n}) = 2^{\log 2^n} = 2^{\log 2^n} = n = \Theta(n)$
 $a = b^{\log_b a}$

Ex 2

1. Evaluate the postfix arithmetic exp: $10\ 3\ 4\ -\ 5\ *\ /$

Symbol scanned	Stack
10	10
3	10, 3
4	10, 3, 4
-	
5	10, 1, 5
*	10, 5
/	2



2. Convert infix to postfix: $(((2 + 3) * 5) - 15)$

Symbol	Stack	postfix
((
(((
((((
2	(((2
+	(((+	2
3	(((+	23
)	(()	23+
*	((*	23+
5	((*	23+5
)	(()	23+5*
-	(-	23+5*
15	(-	23+5*15-