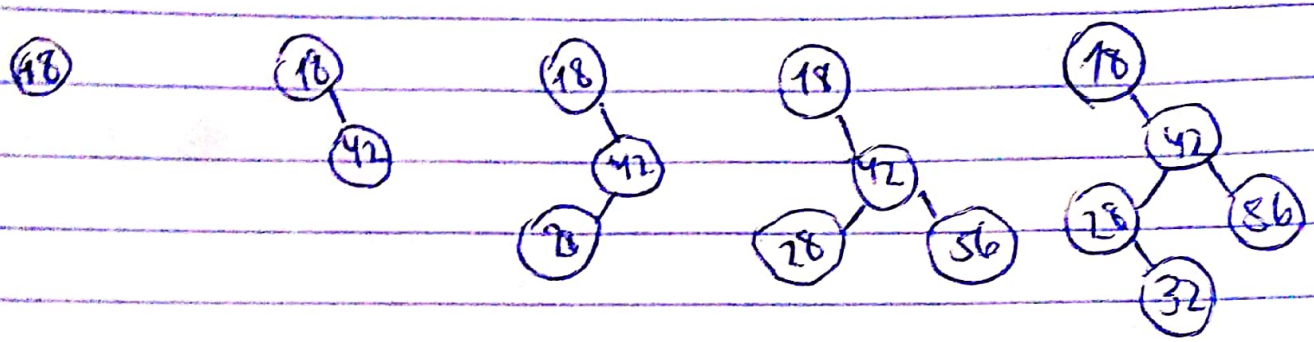
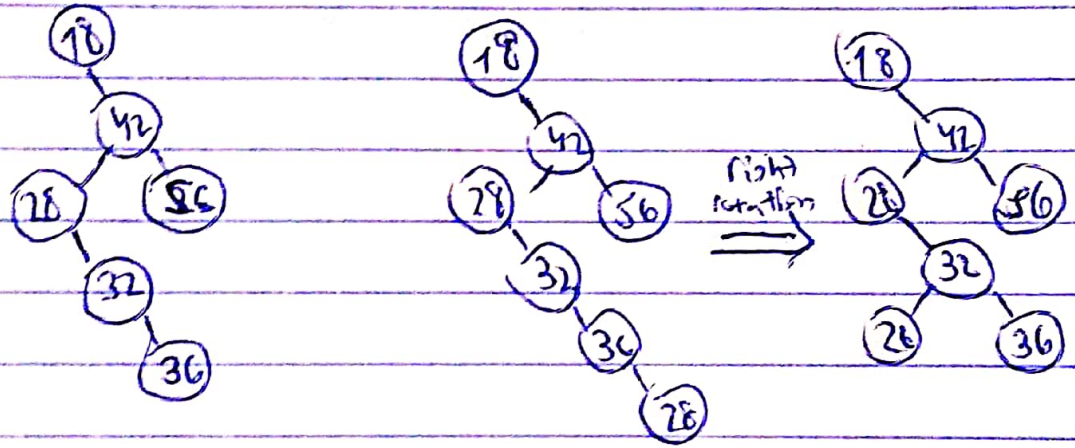
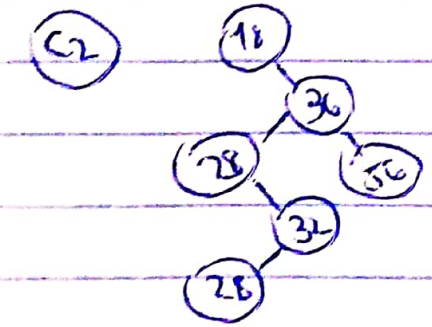
5 E1 18, 42, 28, 56, 32, 36, 28







(A) 6 (the worst case being the numbers go back wards)

(B) second largest element in a minimum heap would be found between the floor $(\frac{n-1}{2})$th index and the n-1 th index

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6 (A) $\Theta(\log_3 2.7^n)$

Since the loop is incrementing by 3 so the number of steps is log of the number of times the loop runs

(B) $\sum i=1$ to $\sqrt{n}$ of $(\sqrt{n} \cdot \sqrt{n} \cdot i)$

which is $\frac{1}{2}(\sqrt{n}-1)n^{\frac{3}{2}}$

$\frac{n^2}{2} + n^{\frac{1.5}{2}}$

so therefore $\Theta(n^2)$

(2) (A) (A1) The height of the tree at most would be h-2 since the smallest ~~tree~~ node is a leaf (=1) we would take off a leaf, which would also effect the height of its parent by 1, so therefore all together the most it could may is h-2.

(A2) The weight of the tree at least would be h-3 since we would ~~delete~~ delete a node that has 1 song (weight of 3) and replace it with its predecessor, then we would only decrement the tree by 3 by changing the parent of that ~~the~~ predecessor

(B) (B1) n-1 because every additional node increases the weight by 2

if you add a leaf, it's parent's height increases by 1 and the tree going a leaf +1

So its plus 2 for every node you add

(B1) MAH since a tree with 1 node is a leaf, max = min = 1 then by induction, it follows the max = Min = 2n-1

2n because it's 2 for every node and then -1 to fit the base case of weight(n) = 1

weight (n-1) = 1

(B2) n-1 (same explanation from B1)

(1) (A) (A1) theta (Θ)

$$\lim_{n \to \infty} \frac{\log(\sqrt{n})}{\log(n)} = \frac{1}{2}$$

(1) (A) (A2) little ω

$$\lim_{n \to \infty} \frac{2n^3 - 4\log^2 n}{8n^2 + 10\log(n^2) - 4\log^2 n} = \infty$$

(1) (A) (A3) little ω

$$\lim_{n \to \infty} \frac{n^2 n}{n^2} = \infty$$

① (B) $n^3 - 2n - \log n = O(0.5n^3 - 4n + \log^2 n)$

true

$c = 1$ (can be anything, as long as it's $> n_0$)

$n_0 = 0.054$

② X

④ (A) Sort the intervals by their low values. Since these values are all

step 1 ← between 1 and n^2, you can do this in linear time with a base of n

radix sort.

step 2 ← check each interval to see if it overlaps the next.

(B)

Declaration of Integrity

I _____tamar harizy_____ hereby declare that I will do this exam myself.

Apart from the basic duty of honesty that every person has, this signature has an obligation under Torah law not to copy or use any extra material (apart from what is allowed in this test), and to meet all the integrity requirements of the test.

Signature: _____tamar harizy_____