2. Here is the result of the last call:

```
fasttmul(  0b10011011 * 0b10111010 ( 155 * 186 )  )
xL  xR  yL  yR 0b1001 0b1011 0b1011 0b1010
pl  pr  pz  pz-pl-pr 0b1100011 0b1101110 0b110100100 0b11010011
result 0b111000010011110 ( 28830 )
```

3. (a)

$$T(n) = 3T(n/2) + cn = \ldots = 3^k T(n/2^k) + cn \sum_{j=0}^{k-1} (3/2)^k =$$
$$= 3^k T(n/2^k) + cn((3/2)^k - 1)$$

(b)

$$\begin{aligned} T(n) &= T(n-1) + O(\lg n) \\ &= T(n-2) + O(\lg n - 1) + O(\lg n) \\ &= T(n-3) + O(\lg n - 2) + O(\lg n - 1) + O(\lg n) \\ &\ldots \\ &= T(1) + \sum_{j=2}^{n} O(\lg j) \\ &= T(1) + O(\sum_{j=2}^{n} \lg j) \\ &= O(n \lg n) \end{aligned}$$

Text, exercise 2.3, with this change: in part (b), replace $O(1)$ with $O(\lg n)$.

4. a) master theorem, $O(n^{\lg_2 5})$ b) $T(n) = 2T(n-1) + c$, so expanding gives $O(2^n)$ c) master theorem, $O(n^d \lg n) = O(n^2 \lg n)$

5. a) $\Theta(n^{\log_3 2})$ b) $\Theta(n^{\log_4 5})$ c) $\Theta(n \lg n)$ d) $\Theta(n^2 \lg n)$ e) $\Theta(n^3 \lg n)$ f) $\Theta(n^{3/2} \lg n)$ g) $\Theta(n)$ h) $\Theta(n^{c+1})$ i) $\Theta(c^n)$ j) $\Theta(2^n)$ k) $\Theta(\lg \lg n)$

6. $\Theta(n^{\lg_2 6})$

7. $T(n) = 2T(n/2) + 1$, so $\Theta(n)$

8. query elements $A[1], A[2], \ldots, A[2^t]$ until you find the first position that is past the end of the list. then use binary search to find the last element of the list. so $O(\lg n)$.

9. pre and post values are 1,12 2,11 3,10 13,18 5,6 4,9 14,17 15,16 7,8 respectively.

10. pre and post values are 1,16 2,16 3,14 4,13 8,9 7,10 6,11 5,12, and then 1,16 2,11 4,5 6,9 7,8 3,10 13,16 12,15.