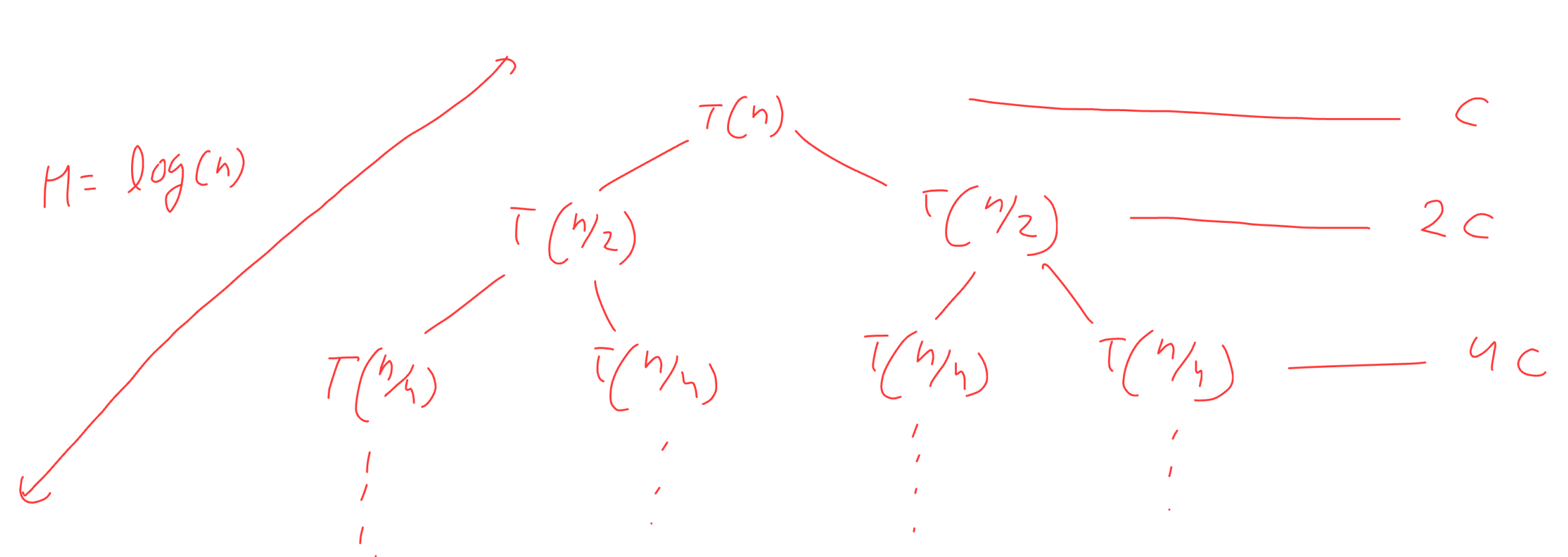
```
void fun(int n, bool b) {
    ...
    return fun(n/2, true) + fun(n/2, false);
}
```

$T(n) = 2T(n/2) + \boxed{c}$



$\underbrace{1, 2, 4, 8 \ldots\ldots, n/4, n/2, \boxed{n}}_{x \text{ - is the no. of terms}}$

$a = 1, \quad r = 2$

$a \cdot r^{x-1} = n$

$2^{x-1} = n$

$x - 1 = \log_2 n$

$\Rightarrow x = O(\log_2 n) = O(\log n)$

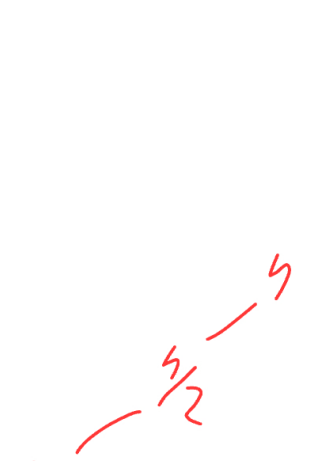
$\underbrace{c + 2c + 4c + 8c + \ldots\ldots}_{\log n \text{ terms}}$

$a = c \quad r = 2 \quad$ no. of terms $= \log n$

$\frac{a(r^n - 1)}{r - 1} \qquad \frac{c(2^{\log n} - 1)}{2 - 1} = O(2^{\log n})$

$= \underline{O(n)}$

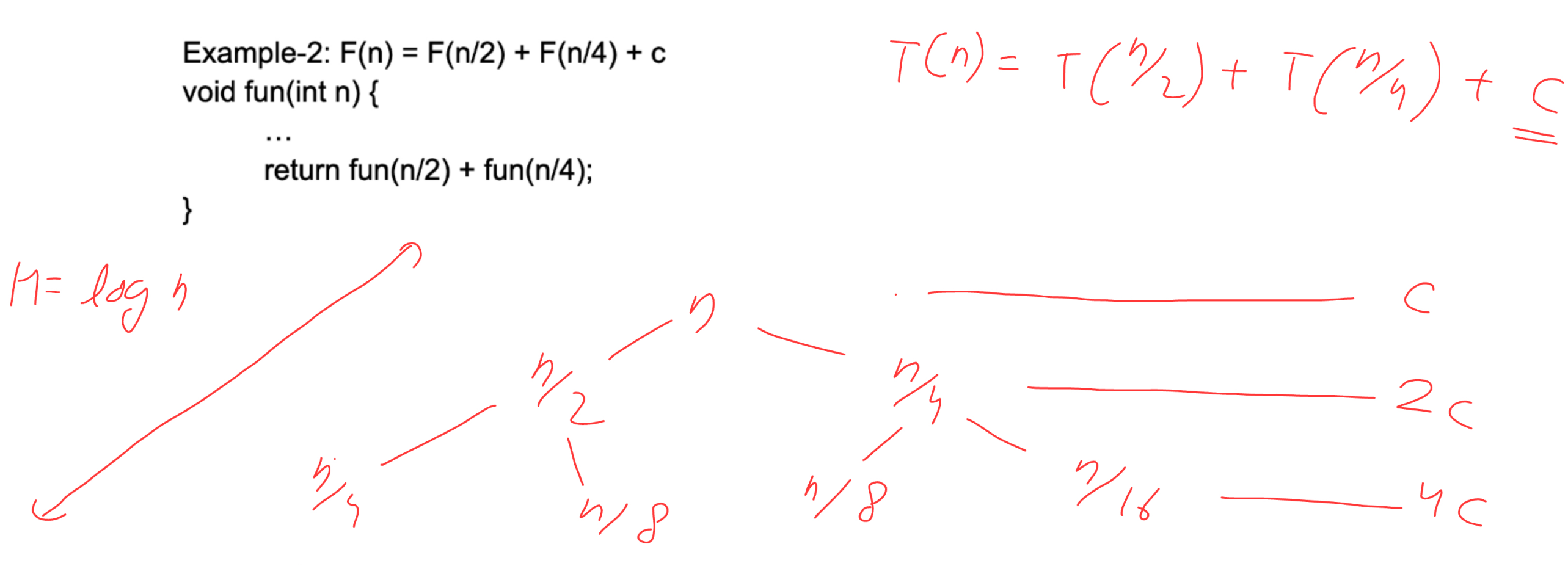
TC = O(n)
AS = O(log n)



Example-2: F(n) = F(n/2) + F(n/4) + c

```
void fun(int n) {
    ...
    return fun(n/2) + fun(n/4);
}
```

$T(n) = T(n/2) + T(n/4) + c$



$\underbrace{c + 2c + 4c + 8c + \ldots\ldots}_{H = \log n \text{ terms}}$

TC = O(n)
AS = O(log n)

---

level

leveal ×

"race a car" → "raceacar" ×

"A_man! nama" → "amannama" ✓

Uppercase.

ch >= 'A' && ch <= 'Z'

Lowercase

ch >= 'a' && ch <= 'z'

Numeric.

ch >= '0' && ch <= '9'

Uppercase to Lowercase.

ch - 'A' + 'a'

Lowercase to Uppercase

ch - 'a' + 'A'

eg. ch = 'C'

$\underbrace{'C' - 'A'} + 'a'$

2 + 'a' = 'c'

ch = 'A'

'A' - 'A' + 'a' = 'a'

A_man: nama

char a	char b
A	A
U	U
→ U	L ✓
→ L	U ✓
L.	L

a - 'A' + 'a' == b
b - 'A' + 'a' == a

---

n = ~~1~~ ~~2~~ ~~3~~ ~~4~~

rev = ~~0~~ 4321

n = ~~12~~

~~rev =~~ 432

last = ~~4~~ ~~3~~ ~~2~~ 1

last = n % 10
rev = rev * 10 + last
n = n/10

n = 1234

2 comp.

n = 1234

" .... "

617 comp.

---

a = 2   b = 3

res = 1   2×2×2

TC = O(b)
AS = O(1)

a = 2   b = 5

$2^5 = 2^2 \times 2^2 \times 2$

a = 2   b = 6

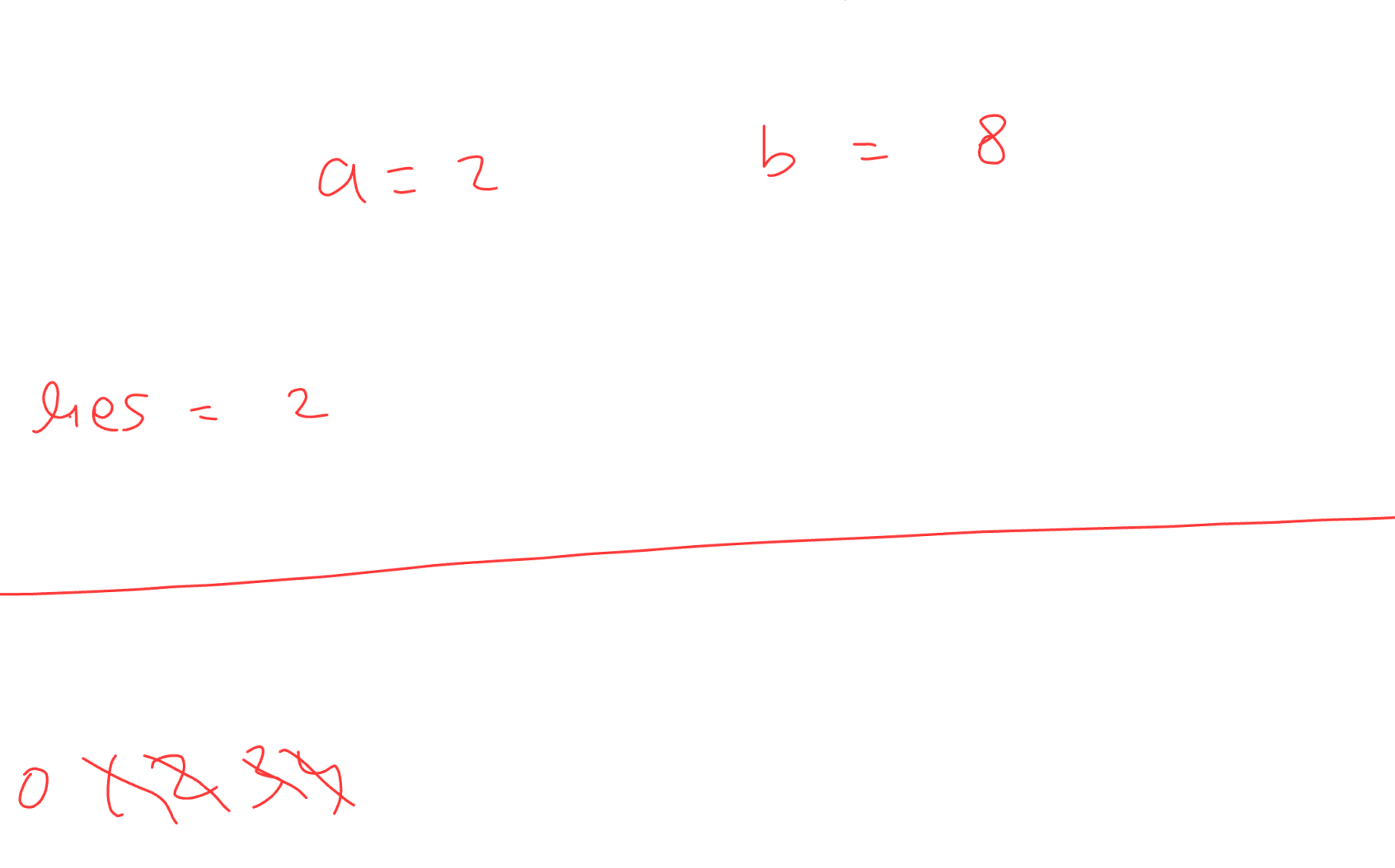
$\underbrace{2 \times 2 \times 2} \times 2 \times 2 \times 2$

$a^b = a^{b/2} \times a^{b/2}$ if b is even.

$= a \times a^{b/2} \times a^{b/2}$ if b is odd.

$\cancel{a}^1 = a^{0} \times \cancel{a}^{0}$

$T(b) = T(b/2) + c$



Total:
c * H
= c * log b
TC = O(log b).

a = 2   b = 8

res = 2

---

0 ~~1~~ ~~2~~ ~~3~~ ~~4~~

digit = ~~0~~ ~~1~~ ~~2~~ ~~3~~ 4

---

n = 25

1 ...... 9 : 9
10 ...... 25 : 32

B.F. :   TC : O(n log n)
         AS : O(1)