Output:

1

$T(n) = 2T(n - 1) + 1$

$T(0) = 1$

$T(n) = 2T(n - 1) + 1$

$T(n - 1) = 2T((n - 1) - 1) + 1$

$T(n - 1) = 2T(n - 2) + 1$

$T(n) = 2(2T(n - 2) + 1) + 1$

$T(n) = 4T(n - 2) + 2 + 1$

$T(n - 2) = 2T((n - 2) - 1) + 1$

$T(n - 2) = 2T(n - 3) + 1$

$T(n) = 4(2T(n - 3) + 1) + 2 + 1$

$T(n) = 8T(n - 3) + 4 + 2 + 1$

$T(n - 3) = 2T((n - 3) - 1) + 1$

$T(n - 3) = 2T(n - 4) + 1$

$T(n) = 8(2T(n - 4) + 1) + 4 + 2 + 1$

$T(n) = 16T(n - 4) + 8 + 4 + 2 + 1$

$T(n) = 2^k * T(n - k) + (2^k) - 1$

$n - k = 0$ so $k = n$

$T(n) = 2^n * T(0) + (2^n) - 1$

$T(n) = 2^n * 1 + 2^n - 1$

$T(n) = 2^{(n+1)} - 1$

$O(2^n)$, class exponential

#2

$T(n) = T(n - 2) + n^2$

$T(0) = 1$

$T(n) = T(n - 2) + n^2$

$T(n - 2) = T((n - 2) - 2) + (n - 2)^2$

$T(n - 2) = T(n - 4) + (n - 2)^2$

$T(n) = [T(n - 4) + (n - 2)^2] + n^2$

$T(n) = T(n - 4) + (n - 2)^2 + n^2$

$T(n - 4) = T((n - 4) - 2) + (n - 4)^2$

$T(n - 4) = T(n - 6) + (n - 4)^2$

$T(n) = [T(n - 6) + (n - 4)^2] + (n - 2)^2 + n^2$

$T(n) = T(n - 6) + (n - 4)^2 + (n - 2)^2 + n^2$

$T(n) = aT(n/b) + f(n)$

$T(n) = a*T(n/b) + n^d$

#4

T(n) = 2T(n/4) + 1

T(0) = 1

A = 2

B = 4

D = 0

n^logb(a) = n^log4(2) = n^0.5

T(n) = O(n^logb(a)) = O(n^log4(2)) = O(n^0.5)

O(n^0.5) class polynomial

#5

T(n) = 2T(n/4) + n^1/2

T(0) = 1

A = 2

B = 4

D = 1/2

n^logb(a) = n^log4(2) = n^0.5

T(n) = O(n^d log n) = O(n^0.5 log n)

O(n^0.5 log n) class polynomial * log

#6

T(n) = 2T(n/4) + n^2

T(0) = 1

A = 2

B = 4

D = 2

n^logb(a) = n^log4(2) = n^0.5

T(n) = O(n^d) = O(n^2)

O(n^2) class polynomial

#7

T(n) = 10T(n/3) + n^2

T(0) = 1

A = 10

B = 3

D = 2

n^logb(a) = n^log3(10) = n^2.10

T(n) = O(n^logb(a)) = O(n^log3(10)) = O(n^2.10)

O(n^2.10) class polynomial

#8

T(n) = 2T(2n/3) + 1

T(0) = 1

T(n) = 2T(n / (3/2)) + 1

A = 2

B = 3/2

D = 0

n^logb(a) = n^log(3/2)(2) = n^1.71

T(n) = O(n^logb(a)) = O(n^log(3/2)(2)) = O(n^1.71)

O(n^1.71) class polynomial