14. Find a general solution of an = 2an-1 + 3(2n).

The associated homogeneous recurrence is an = 2an-1.

The characteristic equation is r – 2 = 0.

A general solution to the homogeneous recurrence is an = c2n.

Using the formula from 2020-03-17,

s = 2

t = 0

Notice that s is a solution of the characteristic equation with multiplicity 1.

The general solution is

an­ = dn2n + c2n.

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

a = 2

b = 4

d = 1

a < bd

T(n) = Θ(n)

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

a = 4

b = 4

d = 1

a = bd

T(n) = Θ (n log(n))

3. T(n) = 5T(n/4) + n

a = 5

b = 4

d = 1

a > bd

T(n) = Θ (ne) where e = log­4(5)

4. T(n) = 16T(n/4) + n

a = 16

b = 4

d = 1

a > nd

T(n) = Θ (n2) since log4(16) = 2

5. T(n) = 16T(n/4) + n2

a = 16

b = 4

d = 2

a = nd

T(n) = Θ (n2 log(n))