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))