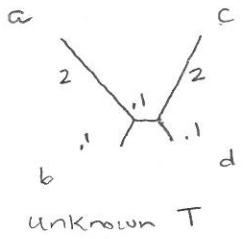
REPEAT until only 3 groups remain in table. Use 3-point formula to finish ↝ the Neighbor-Joining tree.

Example: (Also illustrates that NJ recovers true tree from tree metric dissimilarity data.)



unknown T

	a	b	c	d
a		2.1	4.1	2.2
b			2.2	.3
c				2.1

known data

$R_a = 8.4$ $R_c = 8.4$ $N-2=2$

$R_b = 4.6$ $R_d = 4.6$

$M_{ab} = 2d_{ab} - R_a - R_b = 2(2.1) - 8.4 - 4.6 = -8.8$ *

$M_{ac} = 2d_{ac} - R_a - R_c = 2(4.1) - 8.4 \quad 8.4 = -8.6$

$M_{ad} = 2d_{ad} - R_a - R_d = 2(2.2) - 8.4 - 4.6 = -8.6$

$M_{bc} = 2d_{bc} - R_b - R_d = 2(2.2) - 4.6 - 4.6 = -4.8$

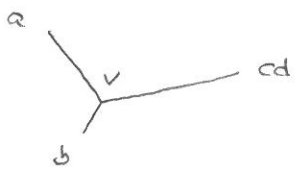
$M_{bd} = 2d_{bd} - R_b - R_d = 2(.3) - 4.6 - 4.6 = -8.6$

$M_{cd} = 2d_{cd} - R_c - R_d = 2(2.1) - 8.4 - 4.6 = -8.8$ *

* = minima!

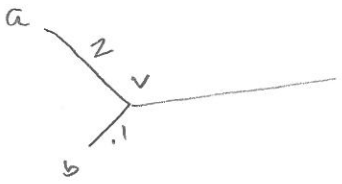
Join a, b:

	a	b	cd
a		2.1	3.15
b			1.25



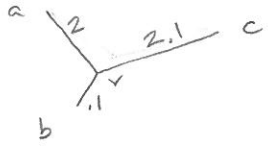
$x = d(a,v) = \frac{1}{2}\left(d(a,cd) + d(a,b) - d(b,cd)\right)$

$= \frac{1}{2}(3.15 + 2.1 - 1.25) = \frac{1}{2} = 2!$



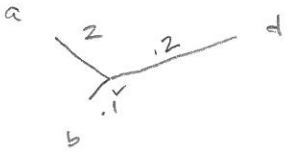
Step 2: Compute $d(v, c)$, $d(v, d)$

	a	b	c
a		2.1	4.1
b			2.2



$d(v, c) = 2.1$

	a	b	d
a		2.1	2.2
b			.3

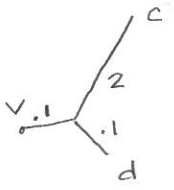


$d(v, d) = .2$

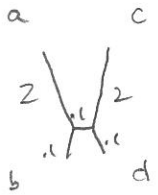
New Table:

	v	c	d
v		2.1	.2
c			2.1

only 3 groups! ⇒ end in sight



Attach at v:



NJ tree = true tree!