Straus Theory Exercises

Ch. 3: III-V (p. 115-16)

Set Class Membership, Z-Relation, and Complement Relation

ANSWERS

III. 1.

Which tetrachordal set classes have fewer than 24 members?
4-1, 4-3, 4-6, 4-7, 4-8, 4-9, 4-10, 4-17, 4-20, 4-21, 4-23, 4-24, 4-25, 4-26 & 4-28

Which tetrachordal set classes have fewer than 12 members?
4-9, 4-25 & 4-28

Which set class (cardinality 3-9) is the most symmetrical of all?
6-35 (02468T)—The whole tone scale. It's set class contains only 2 distinct members.

III. 2.

	Set Class*	**No. of distinct members of the set class (24/*d*)**	**The operations that will map it onto itself**	**Degree of Symmetry (*d*)[1]**
a.	3-6 (024)	12	T_0, T_4I	2
b.	4-9 (0167)	6	T_0, T_6,T_1I, T_7I	4
c.	4-28 (0369)	3	T_0, T_3,T_6, T_9,T_0I, T_3I, T_6I,T_9I,	8
d.	6-7 (012678)	6	T_0, T_6,T_2I, T_8I	4

* - The interval class vector and index vector must be determined to find the number of self-mapping T_n and T_nI operations respectively:

a. (024) It's ic vector is <020100>. It's index vector is <102030201000>.
b. (0167) It's ic vector is <200022>. It's index vector is <242000242000>.
c. (0369) It's ic vector is <004002>. It's index vector is <400400400400>.
d. (012678) It's ic vector is <420243>. It's index vector is <246420246420>.

IV. 1.

	Set Class	**Z-correspondent**	**Common ic vector**
a.	4-Z15 (0146)	4-Z29 (0136)	<111111>
b.	5-Z37 (03458)	5-Z17 (01348)	<212320>
c.	6-Z (012567)	6-Z38 (012378)	<421242>
d.	6-Z44 (012569)	6-Z19 (012569)	<313431>

[1] Number of operations that map the set onto itself.

IV. 2.

	Common ic vector	NIF[2]	Cardinality	Set Class	Z-correspondent
a.	<222121>	10	5	5-Z12 (01356)	5-Z36 (01247)
b.	<111111>	6	4	4-Z15 (0146)	4-Z29 (0136)
c.	<224322>	15	6	6-Z28 (013569)	6-Z49 (013479)
d.	<433221>	15	6	6-Z3 (012356)	6-Z36 (012347)

The cardinality *c* of an unordered pc set is the number of elements it contains. You can count the number of intervals formed by a pc set as we did in Ch. 1, or you can read it from the ic vectors. For example, 3-1 (012) with ic vector 210000 forms 3 intervals. Just add up the ic occurrences in the ic vector. 4-1 (0123) with ic vector 321000 forms 6 intervals. 5-Z12 (01356) with ic vector 222121 forms 10 intervals, and so forth.

V. 1.

	Set Class	IC Vector	Info. for complementary set class: FN	IC prop. factor	IC Vector	NIF
a.	3-3 (014)	<101100>	9-3	+6	<767763>	36
b.	4-18 (0147)	<102111>	8-18	+4	<546553>	28
c.	8-27 (0124578T)	<456553>	4-27	-4	<012111>	6
d.	7-Z12 (0123479)	<444342>	5-Z12	-2	<222121>	10

V. 2.

	PC Set	Info. for complementary set class: Literal Complement	Normal Form	Set Class	FN
a.	(0,1,3,4,5,6,9,10)	(2,7,8,11)	[7,8,11,2]	4-18 (0147)	**8-18**
b.	(1,2,3,4,6,8,10,11)	(0,5,7,9)	[5,7,9,0]	4-22 (0247)	**8-22**
c.	(0,1,3,5,6,8,10)	(2,4,7,9,11)	[7,9,11,2,4]	5-35 (02479)	**7-35**
d.	(0,1,2,4,5,6,7,9,11)	(3,8,10)	[8,10,3]	3-9 (027)	**9-9**

Note in V. 2. c. that the complement of 7-35 (the white-key diatonic collection)
5-35 (the black-key major pentatonic collection)

[2] NIF - Number of intervals formed. Add up all of the ic entries to obtain this number.