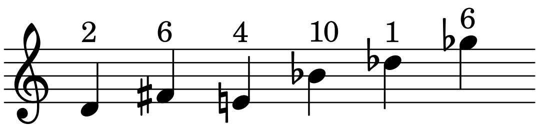
Theory 4 Handout 1

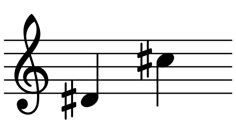
A **pitch class** is A.) a pitch, B.) its enharmonic spellings, and C.) all octave transpositions of A. and B. Pitch classes (pcs) are labeled with a number: the pitch C is pitch class 0, C♯ is pitch class 1, and so on. A pitch-class set is a set of pitch classes (so there!). We will consider the following set (set A).



A **pitch-class set** is indicated by its pitch-class integers in the closest possible arrangement, in ascending order, eliminating duplicates. This is pitch-class set {t 1 2 4 6}.

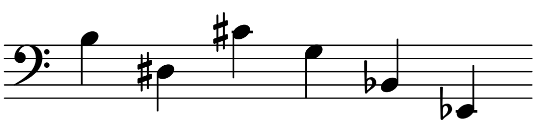
We need to know mod12 arithmetic. If the result is not between 0 and 11, add or subtract 12 until it is.
7 + 8 = 15 (so we subtract 12):   15 - 12 = 3
3 - t = -7 (so we add 12):   -7 + 12 = 5

An **ordered pitch-class interval** is the distance from pc a to b by subtracting (b - a) mod12 (0-11).
An **interval class** is the shortest distance between two pcs (a - b or b - a) mod12 (0-6).



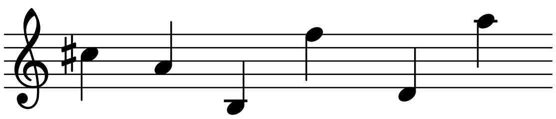
Ordered pci: 1 - 3 = -2; -2 + 12 = 10   Interval class: 3 - 1 = 2

Now consider the following set (set B):



Pitch-class set: {7 t e 1 3}
We determine if two sets are transpositions of each other through subtraction:
  7 t e 1 3   (set B)
- t 1 2 4 6   (set A)
  9 9 9 9 9 9   B = T9A (set B is a transposition of A up ordered pitch-class interval 9)

One more set (set C):



Pitch-class set: {9 e 1 2 5}
Is it a transposition?

```
  9 e 1 2 5
- t 1 2 4 6
  e t e  t e       Nope!  It's not a transposition.
```

To determine if two sets are inversions, first reverse the order of one pitch-class set:
{5 2 1 e 9}   (set C backwards)

Now *add* the integers of both sets:

```
   5 2 1 e 9     (set C reversed)
+ t 1 2 4 6      (set A)
   3 3 3 3 3     C = T3IA       It's an inversion!
```

3 is the **index number** between the two inversionally related sets.

A **set class** is a pitch class set and all of its transpositions and inversions.
Set classes are indicated by the **prime form**. To find the prime form, list all elements of the pitch class set in most compact order. This is called **normal order**.
Assign the number 0 to the first note and assign numbers based on the pitch-class interval formed between the first note and each successive note. Do the same starting with the last note.
The series of numbers with the lowest sum is the prime form.
Indicate prime forms in square brackets [ ].
See Dr. Hicks' packet for more (better) details.
Also be familiar with the **interval class vector**.

An alternate method for determining prime form

1. First determine the pitch class set (the following is set A above).
Rotate the set to find the most compact form:
1 2 4 6 t: t - 1 = 9
2 4 6 t 1: 1 - 2 = -1; -1 + 12 = 11
4 6 t 1 2: 2 - 4 = -2; -2 + 12 = 10
6 t 1 2 4: 4 - 6 = -2 = 10
t 1 2 4 6: 6 - 10 = -4; -4 + 12 = 8

t 1 2 4 6 is the most compact form; it is the normal order.

2. To determine prime form, we need to consider the pcset with its inversion.
Invert each pc by first subtracting from 12:

```
  12 12 12 12 12
-  t  1  2  4  6
   2  e  t  8  6
```

and then reversing the order (to get ascending order):
6 8 t e 2

3. Now I can transpose both sets to begin on 0:

```
  t 1 2 4 6
- t t t  t  t
  0 3 4 6 8

  6 8 t e 2
- 6 6 6 6 6
  0 2 4 5 8
```

4. Sum each result:
0 + 3 + 4 + 6 + 8 = 21
0 + 2 + 4 + 5 + 8 = 19

The lowest sum indicates the winner: [0 2 4 5 8] is the prime form of this set class.