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# PC Set Theory Calculator

**Programmed in May 2024**

## Overview

This is a program I created with the intention of making Set Theory Arithemtic easier. This manual outlines the calculator's key features and how to navigate them, as well as a list of potential errors you might encounter. All the information you need should be in this document, but if it isn't please feel free to email me.

## Core features

1. Calculates the Normal Form of a given set
2. Calculates its prime form
3. Allows user to transpose the set
4. Allows user to invert the set

## Input guidelines

You can input sets with number or letter notation. Separate elements by commas or a space, do not include brackets around the input. The calculator accounts for and removes repeated pitches. Letter names must be capitalized to avoid confusion around "E" vs "e". Capital E is the letter name E natural and will be read by the program as pitch 4. Lowercase e is read as pitch 11. You can avoid potential silly mistakes by just inputting letter names as capital. You can also use "t" as 10.

I programmed the calculator to scan the input field and replace every letter name with a corresponding number. This creates an unintentional feature where the user to input both letter names and number names at the same time. For example, all of the sets below are read exactly the same:

10,11,4
t,e,4
Bb, B, E
10, e, E

## Using the transposition and inversion operators

When you press the “input” button, the set you put into the input box becomes the “current” set, and calculates its normal/prime form. Using the transposition and inversion operators apply to the current set. This means that you cannot put a set in the input box, and then immediately transpose, you first need to press the input button. You should be especially aware of this so you’re certain you’re transposing the correct set, and not the previous one you input.

## Potential Input Errors

**General tip for troubleshooting:** Make sure you are following the instructions for inputting, transposing, and inverting sets carefully. Here are some common errors in detail:

1. Inputting a miscellaneous character
2. No double accidentals (“C##” and “Bbb” are invalid inputs)
3. Trying to invert/transpose a set before calculating it’s normal form
4. Adding a number larger than 11 into the set

**1.** If you receive the message, “Something went wrong with your input, please try again.” it means you input a character the program can’t recognize. As mentioned early, the program does not recognize lowercase letter names for notes, so be careful of that.

**2.** The calculator does not support double accidentals, and this does create some potential user errors. When inputting “C##” the program will replace just the “C#” as 1, and then the calculator will try and read the remaining # as an integer, and will fail.

The calculator not supporting double accidentals creates another reason why I don’t allow lowercase letter names. When inputting “Bbb”, the program will replace the Bb with a 10, and then would read the remaining flat symbol as a lowercase b natural, giving birth to pitch class “1011”. I could potentially add both double accidentals and lowercase letter names, but they are both big sources of potential confusion, so I decided against it.

**3.** If you try using the invert/transpose operators before inputting a set, you will receive the error message, “You must input a set before you can transpose/invert it.” because the program has no current set to draw from.

**4.** The program doesn’t prevent you from inputting pitch classes greater than 11. It also doesn’t prevent you from inputting negative numbers. I built all of the arithmetic under the assumption that you would input valid pitch classes, so if you input anything larger than 11 you will likely get a strange output.