Hayden Walker 2019-2020

This is a portfolio of some of my favourite programs that I wrote during the summer of 2019 and onward.
    *The programs are arranged alphabetically (By folder name, not by title)

NOTE: The following dependencies are required in order to successfully run some of these programs. These dependencies are *not* included in the Python Standard Library.
    *Matplotlib plotting library (for the Collatz Conjecture program)
    *Pygame (for the aquarium program as well as Conway's Game of Life)

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Title (Date) [Dependencies]
    *Skills

    Desc.
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Aquarium (19 August 2019) [Requires Pygame]
    *Pygame
        *Importing sprites
    *Random library
    *Object-oriented programming
        *Multiple instances of a class
        *Each instance is unique and randomized
    *Game loop
    *Math operators
        *Multiplication
    *Conditionals
    *Functions
    *Methods

    A simple aquarium. A random number of fish are spawned, each being an instance of the Fish class. Each is randomly assigned one of four breeds, and each has a randomly assigned speed. The fish will change directions when they come in contact with the screen's edge. Furthermore, each 50 millisecond cycle, each fish has a 1% chance (for each axis) of changing direction on its own, regardless of its position.
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Binary Search Algorithm (21 July 2020)
    *Recursion
    *Conditionals
    *Exception handling

    A binary search algorithm. A sorted array of numbers is given along with a number to search for. The function
will return the position of the target number in the array, or None if it isn't there. Uses recursion.
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Binary to Decimal Converter (18 August 2019)
    *String slicing
        *Reversing
        *Concatenation
    *Iterables
    *Conditionals
    *Math operators
        *Powers

    A simple binary to decimal converter; will accept an arbitrtary amount of bytes of arbitrary lengths.
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Caesar Cypher (25 July 2019)
    *Iterables
    *Conditionals
    *For Loops
    *List wrapping
    *Functions

    Takes an encryption key (n) from 0-25 and moves each character ahead n spaces in the alphabet. If the letter reaches z, it wraps back to a.
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Cash register (3 August 2019)

    *Rounding
    *While Loops
    *Conditionals
    *Functions

    Takes a sales total and amount tendered, then calculates change and lists the amount of each denomination of change to return.

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Collatz Conjecture (7 August 2019) [Requires Matplotlib]
    *A Classic Algorithm
    *While Loops
    *Conditionals
    *Math operators
        *Modulus
        *Floor division
        *Addition
    *Matplotlib Graphing Library

    Takes a positive integer (n), and depending on its parity, will either divide it by 2 or multiply it by 3 then add 1, and repeat the whole process until the integer is equal to 1. It will then display a graph where x is the number of steps and y is the value of n.

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Conway's Game of Life (22 August 2019) [Requires Pygame]
    *A Cellular Automaton
    *Random Library
    *PyGame
        *Rectangles
    *Conditionals
    *Iteration
    *Object-Oriented Programming
    *Functions
    *Methods
    *Game Loop

    Generates 100 squares that can each be either living or dead; each 1-second "generation," if a living square has less than two or more than three living neighbours, it will die from either underpopulation or crowding. If a dead square has exactly three living neighbours, it will become living, via reproduction.

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Line/square drawing (27 July 2019)
    *Tkinter GUI Library
        *Canvas
        *Buttons
        *Inputs
    *Random library
    *Object-Oriented Programming
    *For Loops
    *Functions
    *Methods

    A GUI application that takes a number (n) and, depending on which button is pressed, will generate either n lines or n rectangles, all of random size, position, and colour. It will display the last action completed in a status bar at the bottom.

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Hangman (5 August 2019)
    *Random Library
    *Reading from a text file
    *For Loops
    *Game Loop
    *Conditionals
    *Iterables
    *Functions

    A game of hangman that pulls words from a 100-word text file.

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Minefield/Minesweeper (20 July 2019)
    *System commands
    *Random Library

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    *Wrapping
    *Iterables
    *Conditionals
    *Functions
    *Game loop

    A game that draws a 5x5 grid, in which a random number of randomly placed mines are hidden. Goal:
Clear the board without hitting a mine.
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Pig Latin (19 July)
    *String slicing
    *String concatenation
    *Conditionals

    Converts a word into "Pig Latin;" i.e. if the word begins with a vowel, it will add "ay" to the end,
and if it begins with a consonant, it will move the first letter to the end of the word and then add "ay."
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Recursive Guessing Game (24 August)
    *Recursion
    *Conditionals
    *Math operators
        *Floor division
        *Addition

    The user chooses a number between 0 and 100 (unknown to the computer), and the computer will guess
it. A light project that I included because of recursion.
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Roman Numerals to Integer (19 January 2020)
    *Dictionary data type
    *Conditional
    *For loop
        *Continue
    *Lists/using indexed
    *Iteration

    The user inputs a number in Roman numerals and it is returned as an integer.
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Monty Python's Python Soundboard (31 July)
    *Tkinter GUI Library
        *Buttons
    *Lambda Expressions
    *Object-Oriented Programming
    *Playing audio files

    A just-for-fun soundboard of clips from Monty Python's Life of Brian. Fun Fact: The Python
Programming Language is named after Monty Python!
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