

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)

Title (Date) [Dependencies]

*Skills

Desc.

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.

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.

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 arbitrary amount of bytes of arbitrary lengths.

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.

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.

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.

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.

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.

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.

Insertion Sort (1 August 2020)

- *Iteration
- *Lists

- *For loops
- *Algorithms

Basic insertion sort algorithm

Minefield/Minesweeper (20 July 2019)

- *System commands
- *Random Library
- *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.

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."

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.

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.

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!