

The DISMurdered

DISMATH Final Paper Written Document

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Abstract— This document will give an overview of the subject that discusses the concepts, and lessons that will be of use when creating an application as a project requirement for Discrete Mathematics. The objective is to be able to design and develop an app using MIT App Inventor. The group members have decided to create a horror-themed story game with a twist that consists of DISMATH related questions that are crucial for the user to gather clues so that the user will be able to enter the final stage that will complete the game. The members have created a user-friendly application that will bring addiction to the world of app users.

Keywords—*discrete mathematics; logic; algorithm; functions; relations*

I. Introduction

In today's modern generation, technology has been a great help to humankind. It has evolved throughout years and its uses have become broader and broader each day. From medical technology to machineries, industries, and to many more engineering fields. To further improve computer technology, Discrete Mathematics must be used since it will be the foundation of developing all sorts of applications. Through Discrete Mathematics, one will learn to combine all the algebra taught and use this in real life application instead. This project aims

to integrate the concepts learned during class, so that they would be of use in creating a simple yet unique application. For this mobile app, different concepts of algorithms were applied. The user will have the freedom to choose which question they will answer in order to gain clues. The main objective of this game is for the user to combine all the clues gained from a set of questions in order to reach the final level to defeat your opponent.

II. Concepts

A. Logical Equivalence

Logical equivalence is a type of relationship between two statements or sentences in propositional logic or Boolean algebra.

B. Rules of Inference

Mathematical logic is often used for logical proofs. Proofs are valid arguments that determine the truth values of mathematical statements. It contains certain statements that gives you a conclusion that may be a valid or invalid argument.

C. Growth of Functions

The growth of functions is directly related to the complexity of algorithms. In order to get a handle on its complexity, we

first look for a function that gives the number of operations in terms of the size of the problem, usually measured by a positive integer n , to which the algorithm is applied.

D. Representation of Integers

Computers usually use binary notation (with 2 as the base) when carrying out arithmetic, and octal (base 8) or hexadecimal (base 16) notation when expressing characters, such as letters or digits. In fact, we can use any integer greater than 1 as the base when expressing integers.

E. Graphs

These are structures consisting of vertices and edges that connect these vertices. A graph $G = (V, E)$ consists of V , a nonempty set of vertices (or nodes) and E , a set of edges. Each edge has either one or two vertices associated with it, called its endpoints.

F. Relations

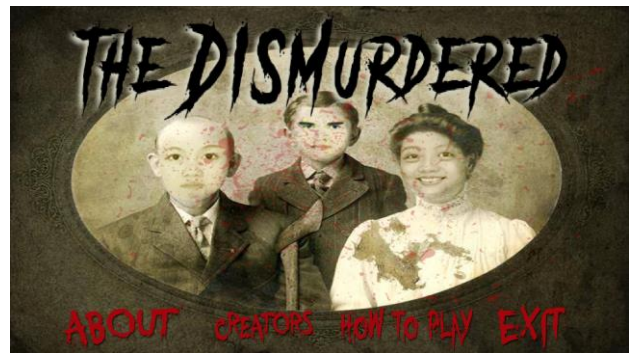
Relationships between elements of sets are represented using the structure called a relation, which is just a subset of the Cartesian product of the sets. When two objects, qualities, classes, or attributes, viewed together by the mind, are seen under some connection, that connection is called a relation.

II. Methodology

This section will show how each screen was made and what it is for.

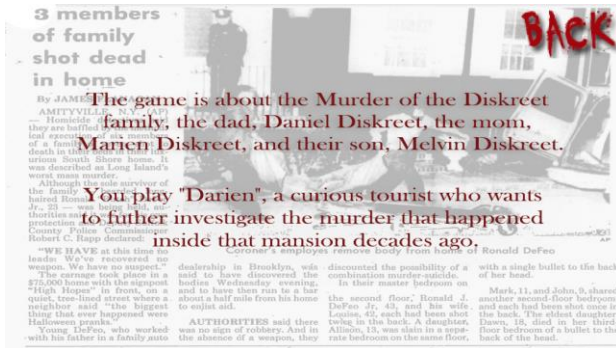
Screen Name: Screen1

Purpose: This is the very first screen of our game.



Screen Name: ABOUT

Purpose: This is a sub screen of Screen1, it contains the story of the game.



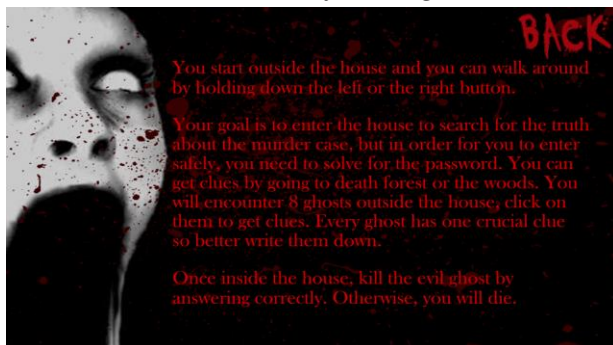
Screen Name: CREATORS

Purpose: This is a sub screen of Screen1, it contains information about the creators of The DISMurdered.



Screen Name: INSTRUCTIONS

Purpose: This is a sub screen of Screen1, it contains the instructions for the game.

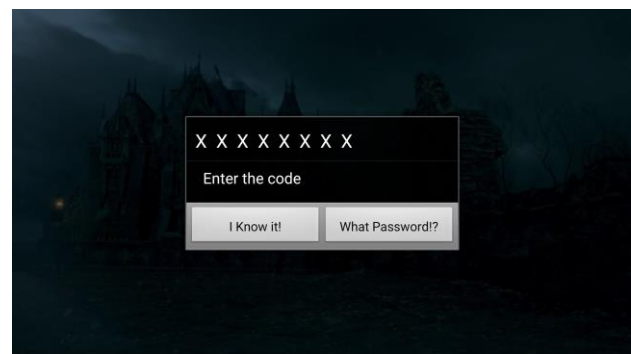


Screen Name: PLAY

Purpose: You play as "Darien", you can walk around by holding either the left or the right button.



Scenario if you click the "HOUSE" Button on the PLAY screen.



Scenario if you click the "I know it" Button on the PLAY screen.



Scenario if you enter the wrong password on the PLAY screen.



Else, you will be taken to the “HOUSE” screen

Blocks for INSTRUCTIONS screen 1 out of 4

```
when RIGHTEDGE . CollidedWith
  other
do
  set RIGHTEDGE . Visible to false
  open another screen screenName "PLAYRIGHT"
```

```
when HOUSE . Click
do
  set HOUSE . Visible to false
  set LEFT . Visible to false
  set RIGHT . Visible to false
  set ImageSprite1 . Visible to false
  set Label1 . TextColor to black
  call Notifier1 . ShowChooseDialog
    message "Enter the code"
    title "X X X X X X X X"
    button1Text "I Know it!"
    button2Text "What Password?"
    cancelable false
```

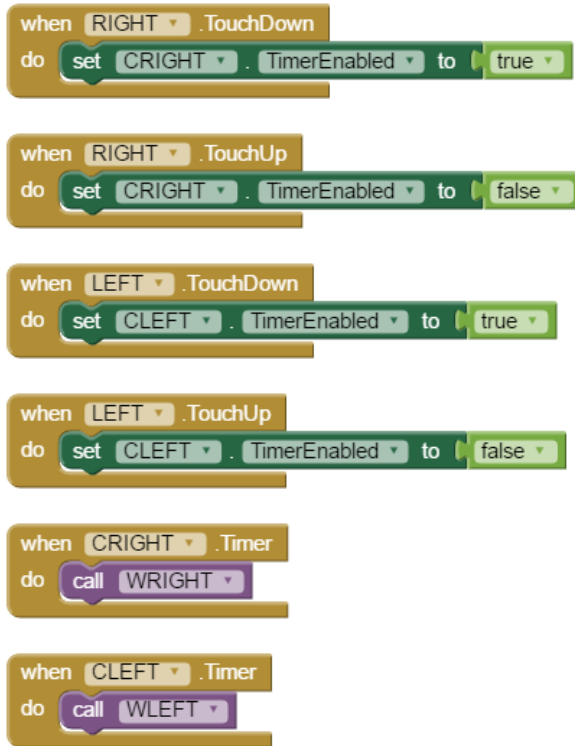
```
when LEFTEDGE . CollidedWith
  other
do
  set LEFTEDGE . Visible to false
  open another screen screenName "PLAYLEFT"
```

Blocks for INSTRUCTIONS screen 2 out of 4

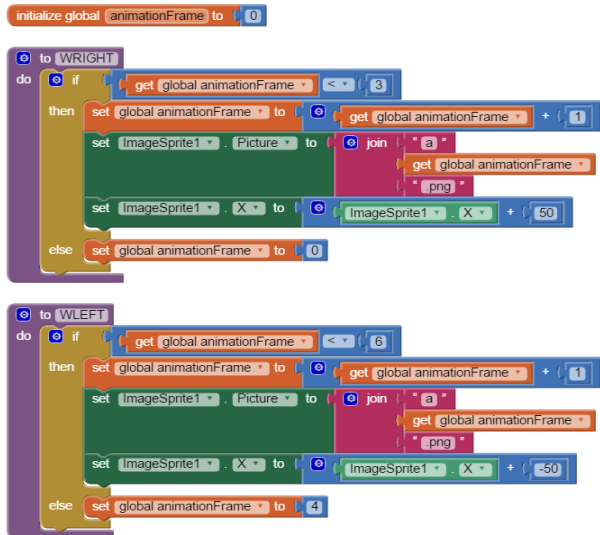
```
when ENTERPASS . Click
do
  if TextBox1 . Text = "DISCRETE"
  then
    open another screen screenName "HOUSE"
  else
    set Label3 . Visible to true
    set PLAY . BackgroundImage to "YOU DIED.png"
    set TextBox1 . Visible to false
    set ENTERPASS . Visible to false
    call Sound2 . Play
    set GAMEOVER . Visible to true
```

```
when Notifier1 . AfterChoosing
  choice
do
  set Label1 . Text to get choice
  if
    compare texts get choice = "I Know it!"
  then
    set PLAY . BackgroundImage to "DOOR.png"
    set ENTERPASS . Visible to true
    set TextBox1 . Visible to true
    set TextBox1 . TextColor to black
    set ImageSprite1 . Visible to false
    set RIGHTEDGE . Visible to false
    set LEFTEDGE . Visible to false
    call Sound1 . Play
  else
    set HOUSE . Visible to true
    set LEFT . Visible to true
    set RIGHT . Visible to true
    set ImageSprite1 . Visible to true
    call TextToSpeech1 . Speak
      message "Damn it"
```

Blocks for INSTRUCTIONS screen 3 out of 4



Blocks for INSTRUCTIONS screen 4 out of 4

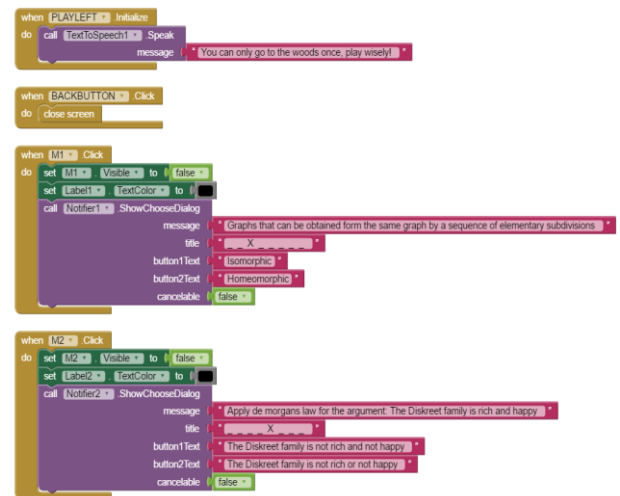


Screen Name: PLAYLEFT

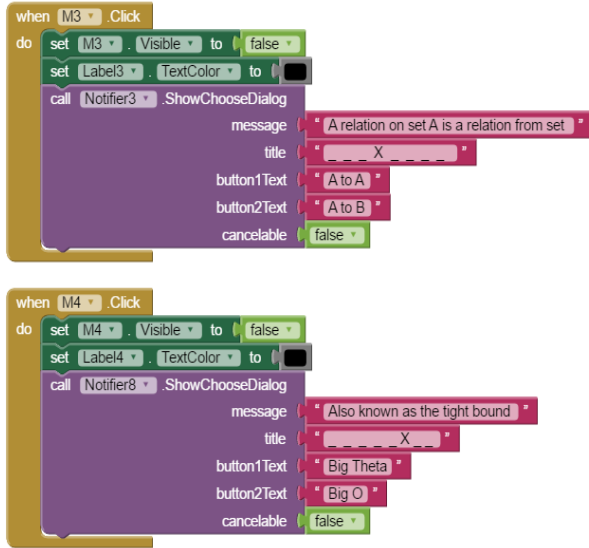
Purpose: As Darien, you can go to “The Woods” to gather 4 out of 8 clues in order to enter the house safely.



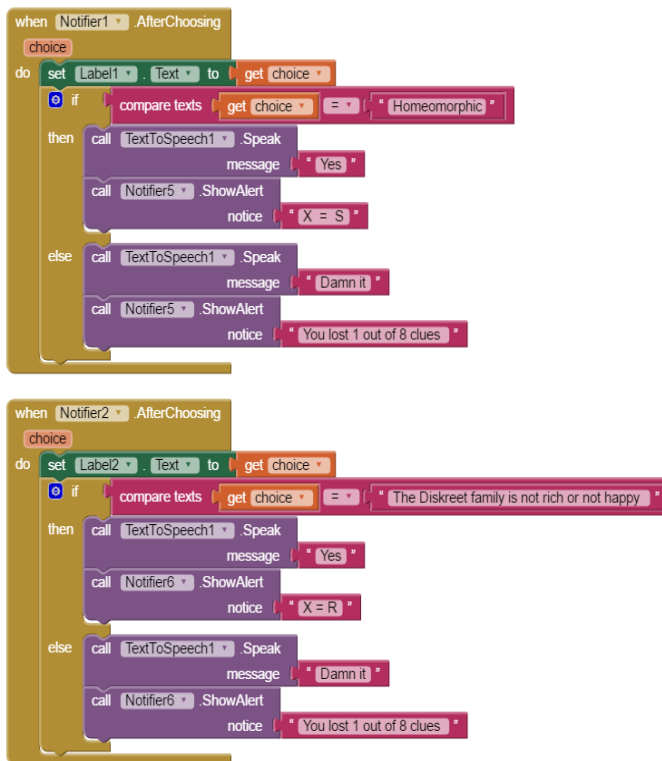
Blocks for PLAYLEFT screen 1 out of 4



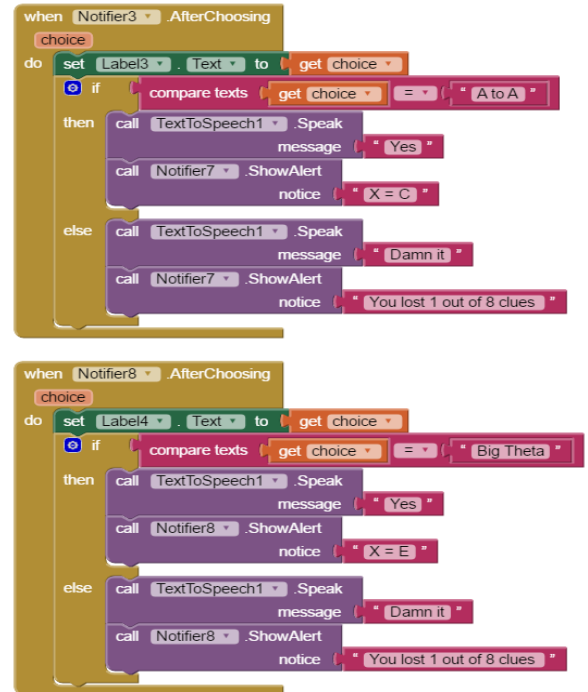
Blocks for PLAYLEFT screen 2 out of 4



Blocks for PLAYLEFT screen 3 out of 4



Blocks for PLAYLEFT screen 4 out of 4

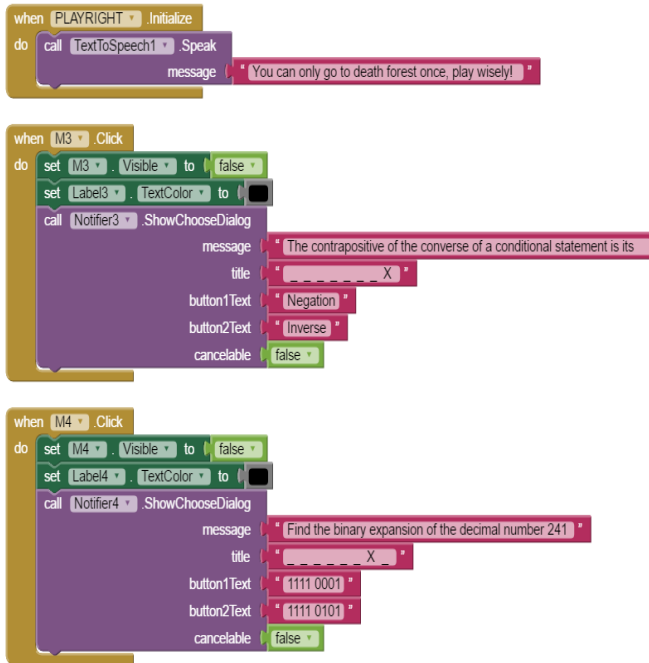


Screen Name: PLAYRIGHT

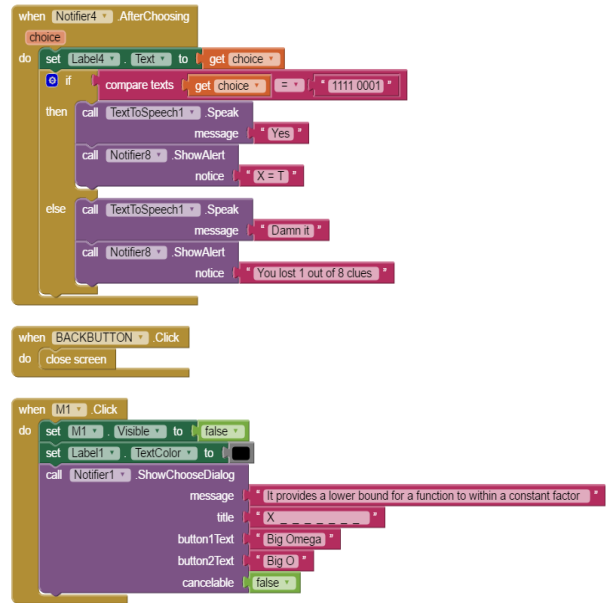
Purpose: As Darien, you can go to “Death Valley” to gather 4 out of 8 clues in order to enter the house safely.



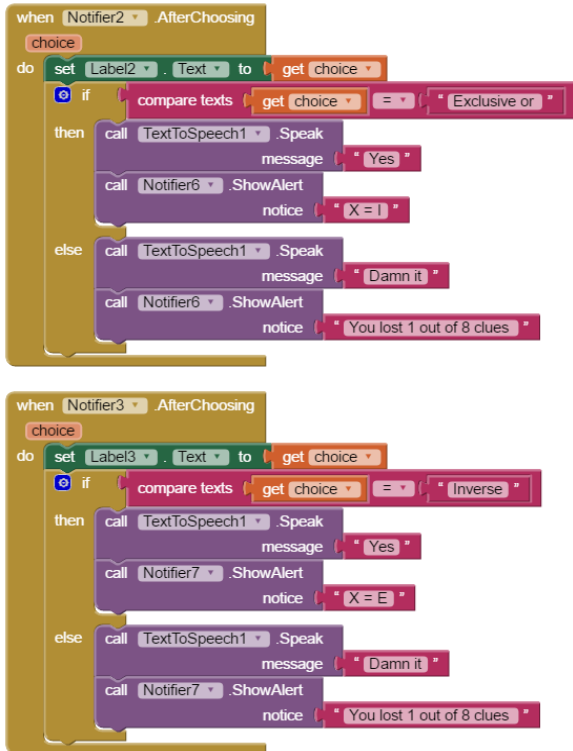
Blocks for PLAYRIGHT screen 1 out of 4



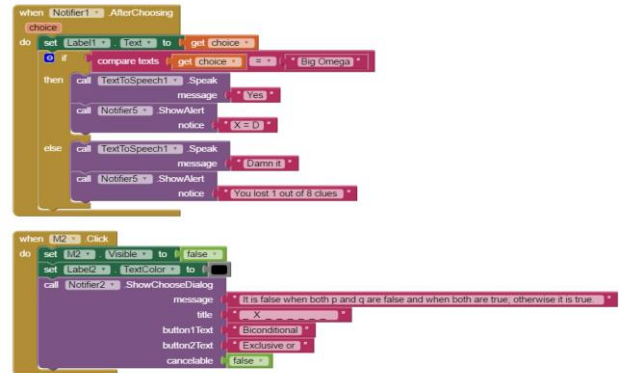
Blocks for PLAYRIGHT screen 3 out of 4



Blocks for PLAYRIGHT screen 2 out of 4



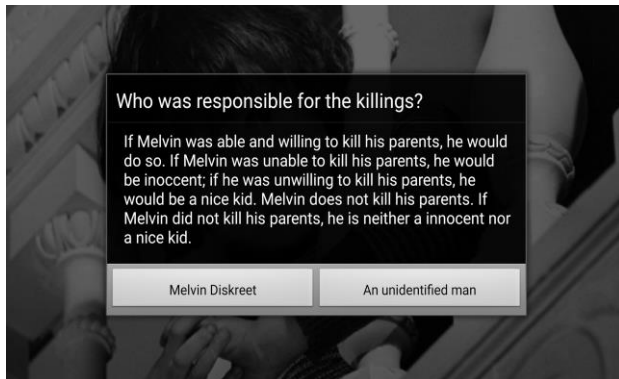
Blocks for PLAYRIGHT screen 4 out of 4



Screen Name: *HOUSE*

Purpose: As Darien, once you approach the front door of the house, you need to enter the password in order to enter safely.

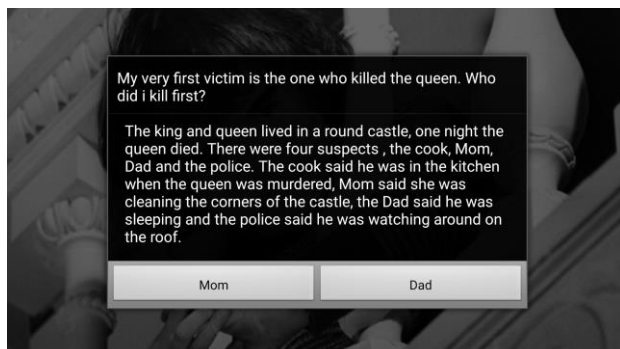
Scenario if you enter the correct password on the PLAY screen.



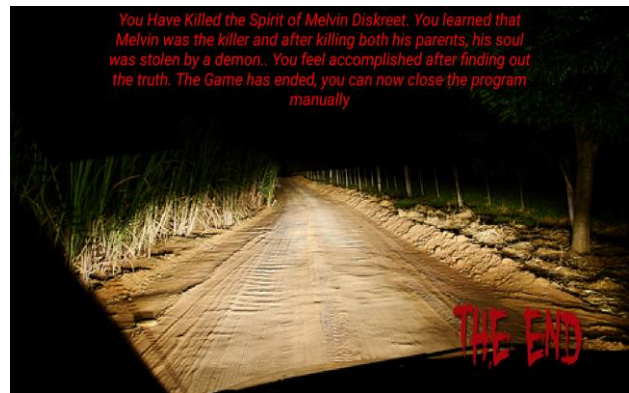
Scenario if you enter the correct answer on the HOUSE screen.



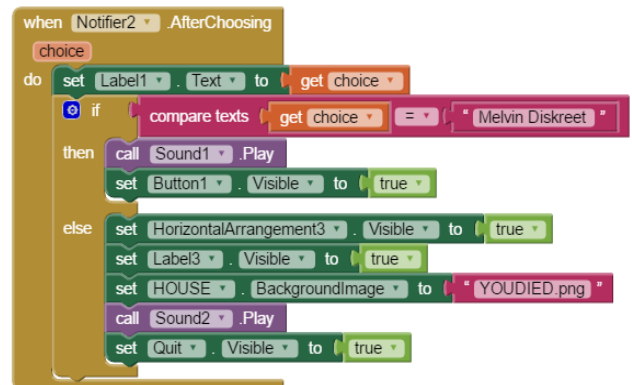
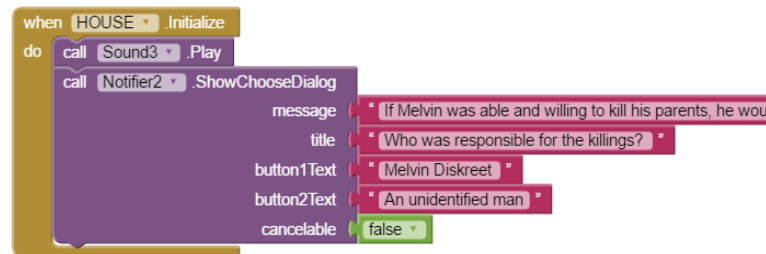
Scenario if you click the “KILL HIM” Button on the PLAY screen



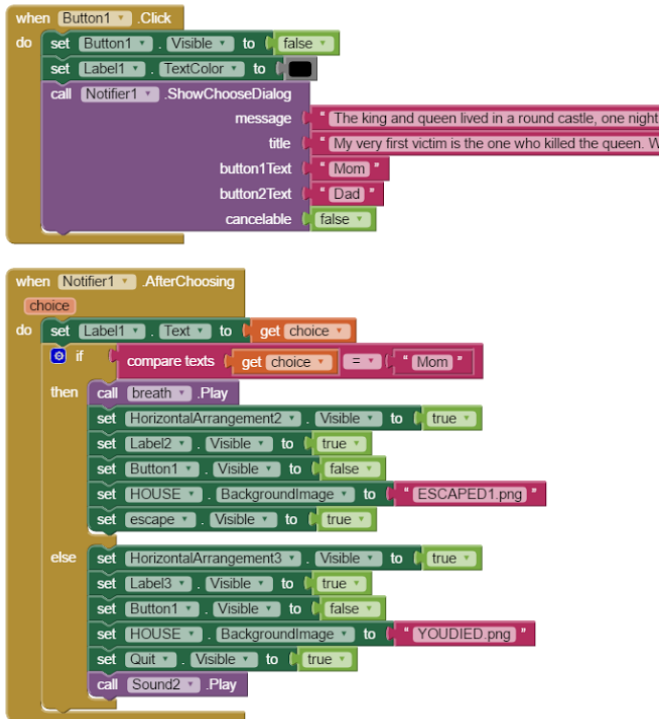
Scenario if you enter the correct answer on the HOUSE screen.



Blocks for HOUSE screen 1 out of 2

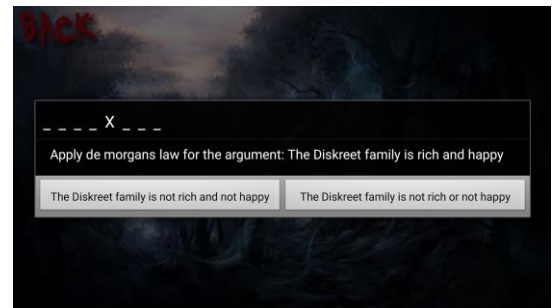


Blocks for HOUSE screen 2 out of 2

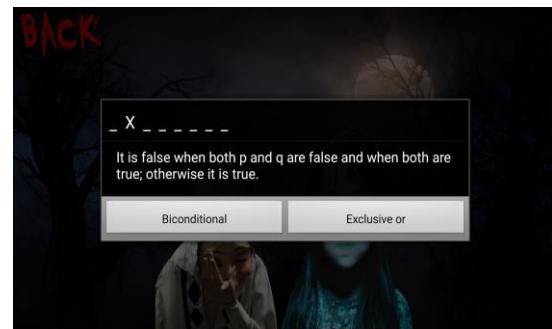


III. Examples

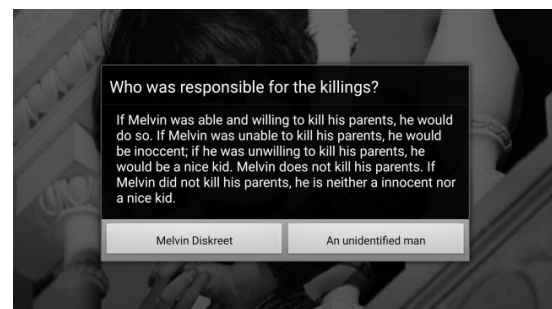
A. Logical Equivalence



Let p = rich
 q = happy
 By applying De Morgan's Law:
 $\neg(p \vee q) = \neg p \wedge \neg q$



B. Rules of inference



Let a = able to kill his parents
 w = willing to kill his parents
 k = kill parents
 i = innocent
 n = nice kid
 e = did not kill

- P1 $(a \wedge w) \rightarrow k$
P2 $\neg a \rightarrow i$
P3 $\neg w \rightarrow n$
P4 $\neg p$
P5 $e \rightarrow \neg i \wedge \neg n$

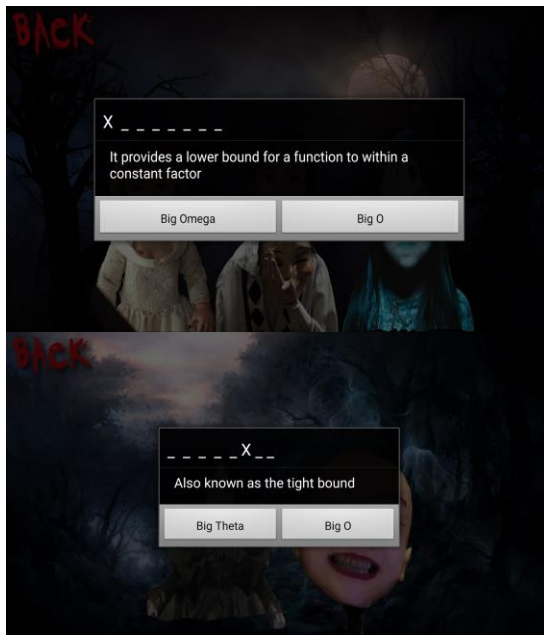
Solution:

- P4 $\neg k$
P1 $\frac{(a \wedge w) \rightarrow k}{= \neg(a \wedge w)}$ (Modus Tollens)
 $= \neg a \vee \neg w$ (De Morgan's)
P2 $\frac{a \vee i}{= \neg w \vee i}$ (Resolution)
P3 $\frac{w \vee n}{= i \vee n}$ (Modus Tollens)
P5 $e \rightarrow \neg i \wedge \neg n$ (Modus Tollens)

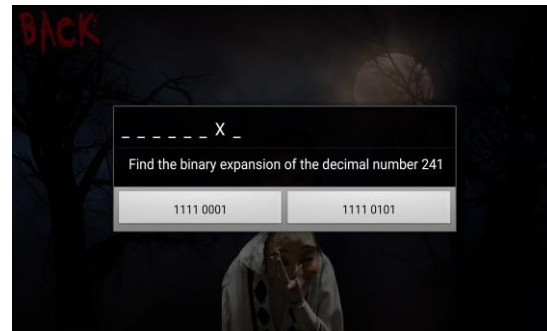
not e

(Therefore melvin did kill his parents)

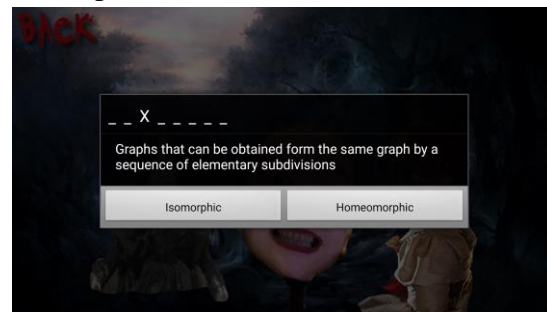
C. Growth of functions



D. Representation of integers



E. Graphs



C. Relations



IV. Acknowledgement

Both members worked very hard and were able to contribute well. Since Danielle Espiritu has a background in programming, she was the one who did the coding. On the other hand, Marien Go, given that she has quite a skill in editing and design, was the one responsible for the graphics of the game. Both members used their advantages very well and incorporated it into one app.

V. References

- [1] T. (n.d.). Discrete Mathematics Rules of Inference. Retrieved April 06, 2017, from https://www.tutorialspoint.com/discrete_maths/rules_of_inference.htm

- [2] What is logical equivalence? - Definition from WhatIs.com. (n.d.). Retrieved April 06, 2017, from <http://whatis.techtarget.com/definition/logical-equivalence>

- [3] M. Cabatuan, "Graph Theory", Github, 2016. [Online]. Available: <https://github.com/melvincabatuan/GraphTheorySlides/blob/master/DISMATHGraphTheory1.pdf>. [Accessed: 12- Apr-2016].

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