**Summary of Test Plan Discussion with Colleagues:**
+ Gargi
    - Make sure your landing page describes the game, so that people can understand what the product is about before trying it out.
    - Incentivise users to sign up on the landing page as well, rather than only giving options to play with no account or play as a user.
    - Having navbar options separately also available on the user dashboard may be a little confusing to users; consider one universal navbar across the site.
+ Areebah:
    - Prevent an admin user for deleting other admin accounts
    - It might be helpful to put a range on the numbers, so that users don't put extremely huge or small values

**Testing Instructions for Expert Users:**
+ *Setup:*
    - Frontend:
        - cd dev/frontend
        - npm i
        - npm run build
        - npm run start
        - Interact with the frontend via localhost:3000
    - Docker setup:
        - cd dev
        - docker compose build
        - docker compose up -d
    - Backend:
        - cd dev/backend
        - pip3 install Flask flask_cors flask_sqlalchemy jsonify
        - Interact with the backend via localhost:4000

+ *Requirements for hardware/software/password key:*
    - Hardware: computer/laptop, keyboard, mouse/trackpad
    - Software: command line interface (in order to use git, npm, and docker commands)

**Automation (Complexity) of Testing Instructions:**
+ *Time and effort to set up the test plan for execution:*
    - Download/setup time for all requirements/testing tools: 20 min (max)
    - Testing time for test cases: ~ 1 hr
    - Testing time for backend: TBD

+ *Testing tools:*
    - Frontend: PyTest + Selenium
    - Backend: Postman

**Amount of Time to Finish the Tests:**
Refer to the 'Expected Time' column in **Test Cases**; however, keep in mind all these times are estimated and the exact duration cannot be properly determined until features are complete.

**Test Cases:**

| Feature | Description | Test Case(s) | Expected Time (max) | Expected Result | Actual Test Result |
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| Landing page | http://localhost:3000/<br><br>When users land on the site, they'll be greeted by the home screen. There is a navigation menu at the top where users have the option to log in, sign up, or go to the game. There is a description of the game. Users will have the option to 'Play Now!'. | User scrolls from top to bottom. | < 1 min | User should be able to scroll and see the navigation menu at the top and the game description, as well as the 'Play Now!' option. All buttons/link should redirect to the correct pages. | Pass/Fail |
| | | User clicks on the Navbar link and selects 'Log In'. | < 1 min | User is shown the Login modal. | Pass/Fail |
| | | User clicks on the Navbar link and selects 'Log In' and selects the 'Create Account' at the bottom. | < 1 min | User is shown the Signup modal. | Pass/Fail |
| | | User clicks on the 'Play Now!' option. | < 1 min | User is redirected to the Game page. | Pass/Fail |
| Account creation | Users can create an account through the navigation menu at the top by clicking 'Log In' and then clicking on the 'Create Account' option, and then creates an account by inputting a valid username, email, and password. | User leaves one of the form fields blank. | < 1 min | The form doesn't submit. User is prompted to fill out the fields they left incomplete. | Pass/Fail |
| | | User tries to create an account with an already existing username. | 1 min | The form doesn't submit. User is alerted that the entered username is associated with another account. | Pass/Fail |
| | | User tries to create an account with an already existing email. | 1 min | The form doesn't submit. User is alerted that the entered email is associated with another account. | Pass/Fail |

| | | User tries to create an account with a password that doesn't meet password requirements | 1 min | The form doesn't submit. User is alerted to create a password that meets the requirements. | Pass/Fail |
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| | | User tries to create an account when both password fields don't match. | 1 min | The form doesn't submit. User is alerted that both password fields must match. | Pass/Fail |
| | | User tries to create an account with a valid username, email, and password. | 1 min | The form submits. User is redirected to the login modal. | Pass/Fail |
| Password hashing | When an account is being created, users' passwords will be hashed before it's stored in the database for security purposes. | Use Postman to test the 'create_user' route with a body that contains a test username, email, and password. | 1 min | The password shouldn't be visible in plaintext in the database or in the API call | Pass/Fail |
| Login | Users can login to a pre-existing account through the navigation menu at the top by clicking 'Log In' and providing the correct credentials associated with said account. | User enters an incorrect username. | 1 min | User is alerted that they entered an incorrect username. | Pass/Fail |
| | | User enters an incorrect password. | 1 min | User is alerted that they entered an incorrect password. | Pass/Fail |
| | | User enters the correct username and password. | 1 min | User is redirected to the User Dashboard. | Pass/Fail |
| | | User enters the correct username and password and password for an admin account. | 1 min | User is redirected to the Admin Dashboard. | Pass/Fail |
| User Authenticatio n | The user's identity will be verified after they login on the Login modal and before they can access certain pages on the site. If authentication fails, the user will be asked to enter their credentials again. | User enters the incorrect credentials on the Login page. | 1 min | User is alerted they entered incorrect credentials. They will not be able to go to the User/Admin Dashboard. | Pass/Fail |
| | | User enters the correct credentials on the Login page. | 1 min | User is redirected to the User/Admin Dashboard. | Pass/Fail |

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| Logout | Users can logout of their account using the 'Log Out' button in the navigation menu. | User clicks the 'Log Out' button in the navigation menu. | < 1 min | User is redirected to the landing page. Their session ends, and they cannot access the User/Admin Dashboard without logging in again. | Pass/Fail |
| Game | http://localhost.com/3000/graph<br><br>Users can choose from many possible puzzles. Each puzzle is a diagram of interconnected nodes. User has to type in positive whole numbers in each node such that each node's number is the sum of the digits of all the numbers connected to it | User clicks on each node and enters a number. After all nodes have been filled, user clicks 'Submit Solution' button to check whether their answer is correct. | ~10 min | User is notified whether their solution is correct and incorrect. If correct, user sees the game end modal. If incorrect, user is prompted to go back to their answers and fix it. | Pass/Fail |
| Get hints | While playing a puzzle, users can click the 'Get Hint' option if they are stuck. | User clicks on the 'Get Hint' option. | < 1 min | User gets a popup that suggests a number they can use to fill in a particular node. | Pass/Fail |
| Get solution | While playing a puzzle, users can click the 'Get Solution' option if they are stuck | User clicks on the 'Get Solution' option. | < 1 min | User gets one of the possible solutions for the puzzle. | Pass/Fail |
| Game end screen | After users complete a level, they will see a screen displaying how long it took them to complete the game, as well as options to either continue to the next puzzle or to go to the landing page. | User completes a puzzle. | < 1 min | User sees how long it took them to complete the game. | Pass/Fail |
| | | User clicks on the 'Yes [to proceed to next level]' option. | < 1 min | User is redirected to the next puzzle. | Pass/Fail |
| | | User clicks on the 'No [to proceed to next level]' option. | < 1 min | User is redirected to the landing page. | Pass/Fail |
| | | User clicks on the 'View all Graphs' option. | < 1 min | User is redirected to the Graph menu page. | Pass/Fail |
| User dashboard | http://localhost:3000/dashboard<br><br>Users have a dashboard | User scrolls through the User Dashboard and views the button to the Account | 1 min | User sees the button to the Account Settings, and their gameplays. | Pass/Fail |

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| | where they can view their account settings, and gameplays. | Settings, and gameplays. | | | |
| User gameplays | Users can view their gameplays about the games they played and how long it took them to complete that game. | User plays a new puzzle, goes to the User Dashboard, and goes to the Game History section. | Time to play a game + < 1 min | User sees all of their previously played games, as well as the new game. | Pass/Fail |
| Admin dashboard | http://localhost:3000/admin-dashboard<br><br>Admins have a dashboard where they can view their admin features such as user account removal and password reset, as well as statistics from the overall recorded data. | Admin scrolls through the Admin Dashboard and views the button to the Account Settings, the User Account Removal feature, the Password Reset feature, and statistics generated from the data. | < 1 min | Admin sees the button to the Account Settings, the User Account Removal feature, the Password Reset feature, and statistics generated from the data. | Pass/Fail |
| Admin user account removal | Admins have the ability to permanently delete user accounts on the Admin Dashboard. | Admin scrolls through the user list and select the user they want to delete. | 1 min | Admin will be alerted that they are trying to delete an account and that the action will be permanent. Once the admin confirms the decision, the user's account will be deleted, along will all the data that is associated with their account. | Pass/Fail |
| Admin password reset | Admins have the ability to reset the password of a user account on the Admin Dashboard. | Admin scrolls through the user list and selects the user they want to to change the password for. | 1 min | Admin gets a popup where they enter the new user password. Once the admin confirms the decision, they will get a confirmation that the user account information was updated. | Pass/Fail |
| Account settings | http://localhost:3000/dashboard<br><br>Users can access the Account Settings through the User/Admin Dashboard, where they can change their username, email, and/or password. User can also delete their account. | User clicks the 'Edit Username' option. | 1 min | If user enters a valid username, their account information will be updated with the new username. | Pass/Fail |
| | | User clicks the 'Edit Email' option. | 1 min | If user enters a valid email, their account information will be updated with the new | Pass/Fail |

| | | | | email. | |
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| | | User clicks the 'Edit Password' option. | 1 min | If user enters a valid password, their account information will be updated with the new password. | Pass/Fail |
| | | User clicks the 'Delete Account' option. | 1 min | User will be alerted that they are trying to delete their account and that the action will be permanent. Once the user confirms the decision, their account will be deleted, along will all the data that is associated with their account. User will be redirected to the landing page. | Pass/Fail |