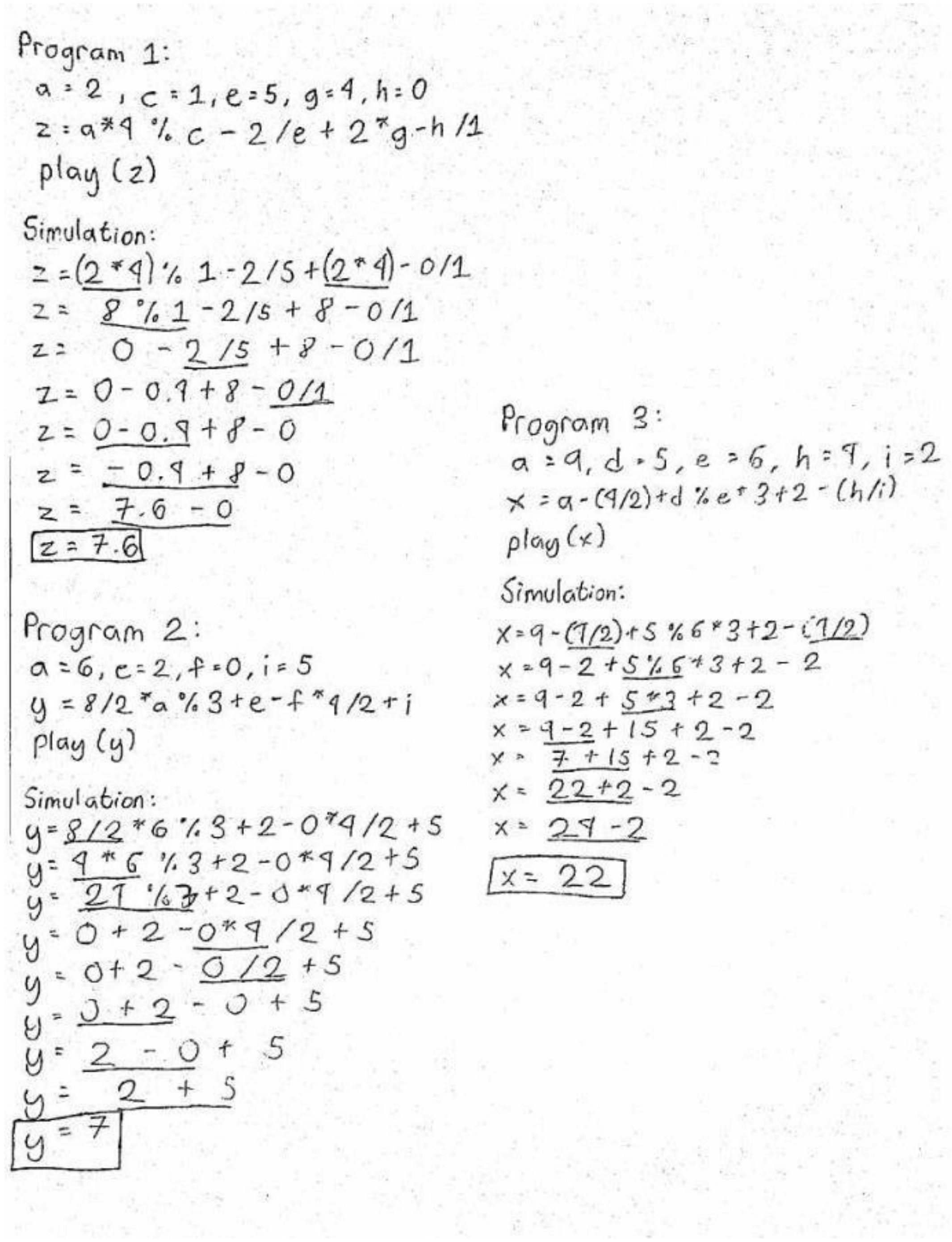
John Vincent S. Racimo
BSCS 3 – 2
2021-01335
DBTK

1. Simulate the expressions using your code (hand written).



Program 1:

a = 2 , c = 1, e = 5, g = 4, h = 0

z = a*4 % c − 2 / e + 2 * g − h /1

play (z)

Simulation:

$z = \underline{(2*4)} \% 1 - 2/5 + \underline{(2*4)} - 0/1$

$z = \underline{8 \% 1} - 2/5 + 8 - 0/1$

$z = 0 - \underline{2/5} + 8 - 0/1$

$z = 0 - 0.4 + 8 - \underline{0/1}$

$z = \underline{0 - 0.4} + 8 - 0$

$z = \underline{-0.4 + 8} - 0$

$z = \underline{7.6 - 0}$

$\boxed{z = 7.6}$

Program 2:

a = 6, e = 2, f = 0, i = 5

y = 8/2 * a % 3 + e − f * 4 /2 + i

play (y)

Simulation:

$y = \underline{8/2} * 6 \% 3 + 2 - 0 * 4/2 + 5$

$y = \underline{4 * 6} \% 3 + 2 - 0 * 4/2 + 5$

$y = \underline{24 \% 3} + 2 - 0 * 4/2 + 5$

$y = 0 + 2 - \underline{0 * 4} /2 + 5$

$y = 0 + 2 - \underline{0/2} + 5$

$y = \underline{0 + 2} - 0 + 5$

$y = \underline{2 - 0} + 5$

$y = \underline{2 + 5}$

$\boxed{y = 7}$

Program 3:

a = 9, d = 5, e = 6, h = 4, i = 2

x = a − (4/2) + d % e * 3 + 2 − (h/i)

play (x)

Simulation:

$x = 9 - (\underline{4/2}) + 5 \% 6 * 3 + 2 - (\underline{4/2})$

$x = 9 - 2 + \underline{5 \% 6} * 3 + 2 - 2$

$x = 9 - 2 + \underline{5 * 3} + 2 - 2$

$x = \underline{9 - 2} + 15 + 2 - 2$

$x = \underline{7 + 15} + 2 - 2$

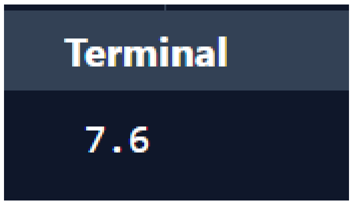
$x = \underline{22 + 2} - 2$

$x = \underline{24 - 2}$

$\boxed{x = 22}$

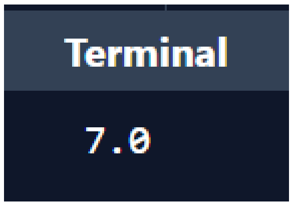
2. Run your compiler and display the output to validate your simulation.

Program 1:



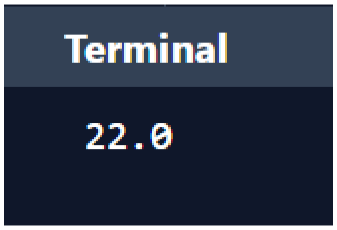
```
7.6
```

Program 2:



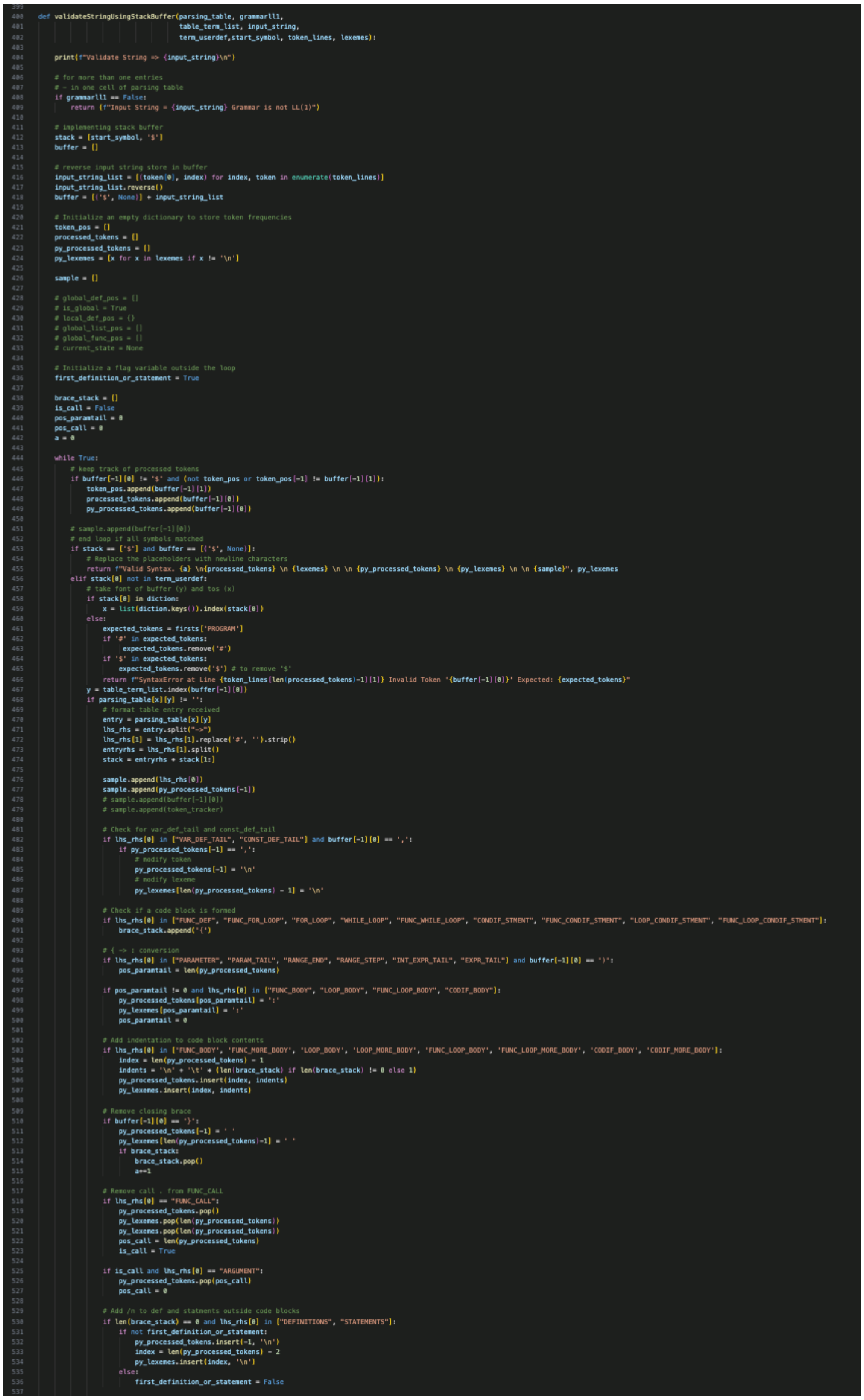
```
7.0
```

Program 3:



```
22.0
```

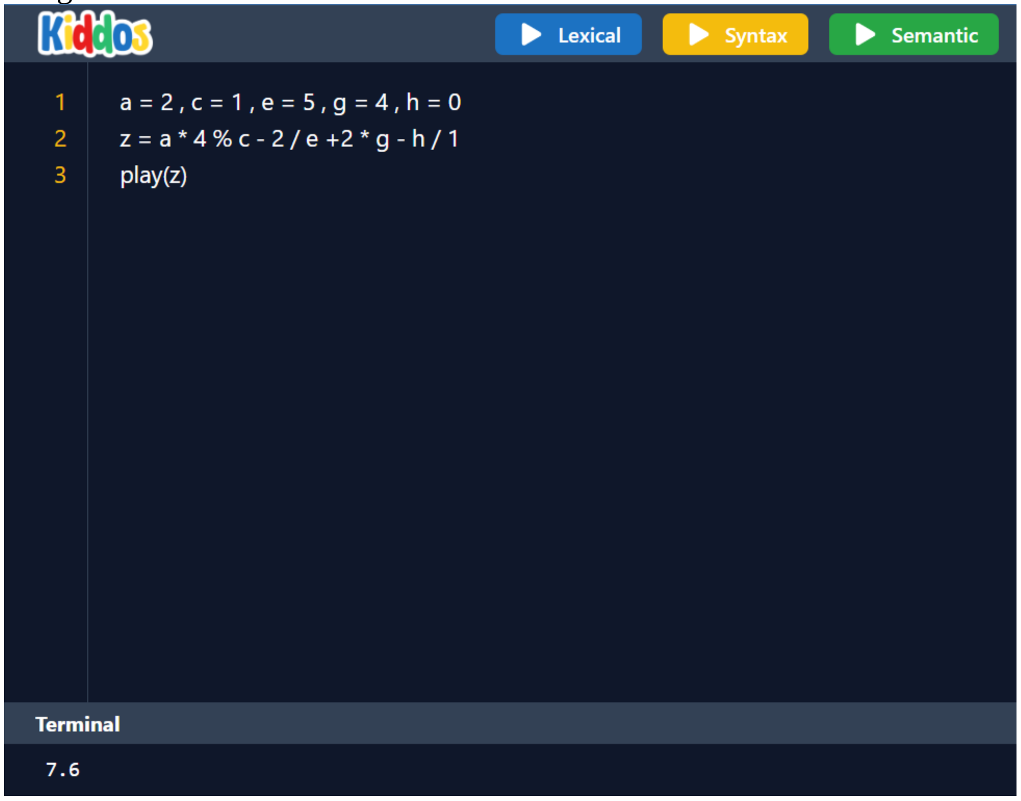
3. Submit the screenshot of your code.



```python

def validateStringUsingStackBuffer(parsing_table, grammarll1,
                                   table_term_list, input_string,
                                   term_userdef,start_symbol, token_lines, lexemes):

    print(f"Validate String => {input_string}\n")

    # for more than one entries
    # - in one cell of parsing table
    if grammarll1 == False:
        return (f"Input String = {input_string} Grammar is not LL(1)")

    # implementing stack buffer
    stack = [start_symbol, '$']
    buffer = []

    # reverse input string store in buffer
    input_string_list = [(token[0], index) for index, token in enumerate(token_lines)]
    input_string_list.reverse()
    buffer = [('$', None)] + input_string_list

    # Initialize an empty dictionary to store token frequencies
    token_pos = []
    processed_tokens = []
    py_processed_tokens = []
    py_lexemes = [x for x in lexemes if x != '\n']

    sample = []

    # global_def_pos = []
    # is_global = True
    # local_def_pos = {}
    # global_list_pos = []
    # global_func_pos = []
    # current_state = None

    # Initialize a flag variable outside the loop
    first_definition_or_statement = True

    brace_stack = []
    is_call = False
    pos_paramtail = 0
    pos_call = 0
    a = 0

    while True:
        # keep track of processed tokens
        if buffer[-1][0] != '$' and (not token_pos or token_pos[-1] != buffer[-1][1]):
            token_pos.append(buffer[-1][1])
            processed_tokens.append(buffer[-1][0])
            py_processed_tokens.append(buffer[-1][0])

        # sample.append(buffer[-1][0])
        # end loop if all symbols matched
        if stack == ['$'] and buffer == [('$', None)]:
            # Replace the placeholders with newline characters
            return f"Valid Syntax. {a} \n{processed_tokens} \n {lexemes} \n \n {py_processed_tokens} \n {py_lexemes} \n \n {sample}", py_lexemes
        elif stack[0] not in term_userdef:
            # take font of buffer (y) and tos (x)
            if stack[0] in diction:
                x = list(diction.keys()).index(stack[0])
            else:
                expected_tokens = firsts['PROGRAM']
                if '#' in expected_tokens:
                    expected_tokens.remove('#')
                if '$' in expected_tokens:
                    expected_tokens.remove('$') # to remove '$'
                return f"SyntaxError at Line {token_lines[len(processed_tokens)-1][1]} Invalid Token '{buffer[-1][0]}' Expected: {expected_tokens}"
            y = table_term_list.index(buffer[-1][0])
            if parsing_table[x][y] != '':
                # format table entry received
                entry = parsing_table[x][y]
                lhs_rhs = entry.split("->")
                lhs_rhs[1] = lhs_rhs[1].replace('#', '').strip()
                entryrhs = lhs_rhs[1].split()
                stack = entryrhs + stack[1:]

                sample.append(lhs_rhs[0])
                sample.append(py_processed_tokens[-1])
                # sample.append(buffer[-1][0])
                # sample.append(token_tracker)

                # Check for var_def_tail and const_def_tail
                if lhs_rhs[0] in ["VAR_DEF_TAIL", "CONST_DEF_TAIL"] and buffer[-1][0] == ',':
                    if py_processed_tokens[-1] == ',':
                        # modify token
                        py_processed_tokens[-1] = '\n'
                        # modify lexeme
                        py_lexemes[len(py_processed_tokens) - 1] = '\n'

                # Check if a code block is formed
                if lhs_rhs[0] in ["FUNC_DEF", "FUNC_FOR_LOOP", "FOR_LOOP", "WHILE_LOOP", "FUNC_WHILE_LOOP", "CONDIF_STMENT", "FUNC_CONDIF_STMENT", "LOOP_CONDIF_STMENT", "FUNC_LOOP_CONDIF_STMENT"]:
                    brace_stack.append('{')

                # { -> : conversion
                if lhs_rhs[0] in ["PARAMETER", "PARAM_TAIL", "RANGE_END", "RANGE_STEP", "INT_EXPR_TAIL", "EXPR_TAIL"] and buffer[-1][0] == ')':
                    pos_paramtail = len(py_processed_tokens)

                if pos_paramtail != 0 and lhs_rhs[0] in ["FUNC_BODY", "LOOP_BODY", "FUNC_LOOP_BODY", "CODIF_BODY"]:
                    py_processed_tokens[pos_paramtail] = ':'
                    py_lexemes[pos_paramtail] = ':'
                    pos_paramtail = 0

                # Add indentation to code block contents
                if lhs_rhs[0] in ['FUNC_BODY', 'FUNC_MORE_BODY', 'LOOP_BODY', 'LOOP_MORE_BODY', 'FUNC_LOOP_BODY', 'FUNC_LOOP_MORE_BODY', 'CODIF_BODY', 'CODIF_MORE_BODY']:
                    index = len(py_processed_tokens) - 1
                    indents = '\n' + '\t' * (len(brace_stack) if len(brace_stack) != 0 else 1)
                    py_processed_tokens.insert(index, indents)
                    py_lexemes.insert(index, indents)

                # Remove closing brace
                if buffer[-1][0] == '}':
                    py_processed_tokens[-1] = ' '
                    py_lexemes[len(py_processed_tokens)-1] = ' '
                    if brace_stack:
                        brace_stack.pop()
                        a+=1

                # Remove call . from FUNC_CALL
                if lhs_rhs[0] == "FUNC_CALL":
                    py_processed_tokens.pop()
                    py_lexemes.pop(len(py_processed_tokens))
                    py_lexemes.pop(len(py_processed_tokens))
                    pos_call = len(py_processed_tokens)
                    is_call = True

                if is_call and lhs_rhs[0] == "ARGUMENT":
                    py_processed_tokens.pop(pos_call)
                    pos_call = 0

                # Add /n to def and statments outside code blocks
                if len(brace_stack) == 0 and lhs_rhs[0] in ["DEFINITIONS", "STATEMENTS"]:
                    if not first_definition_or_statement:
                        py_processed_tokens.insert(-1, '\n')
                        index = len(py_processed_tokens) - 2
                        py_lexemes.insert(index, '\n')
                    else:
                        first_definition_or_statement = False

```

4. Submit the screenshot of your output after running your compiler.

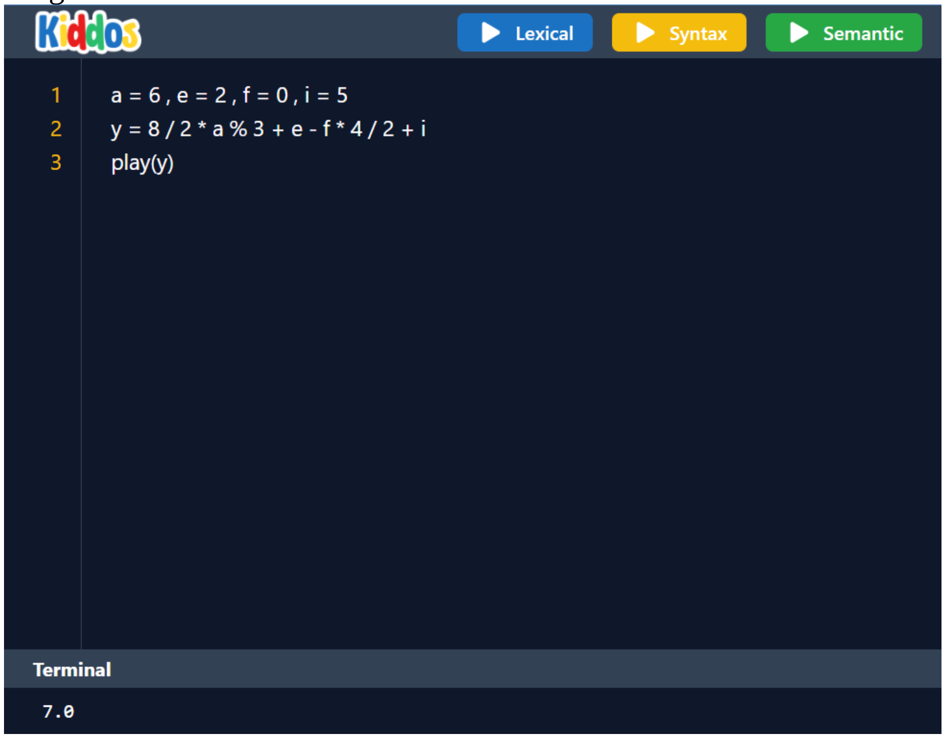
Program 1:



```
a = 2 , c = 1 , e = 5 , g = 4 , h = 0
z = a * 4 % c - 2 / e +2 * g - h / 1
play(z)
```

```
7.6
```

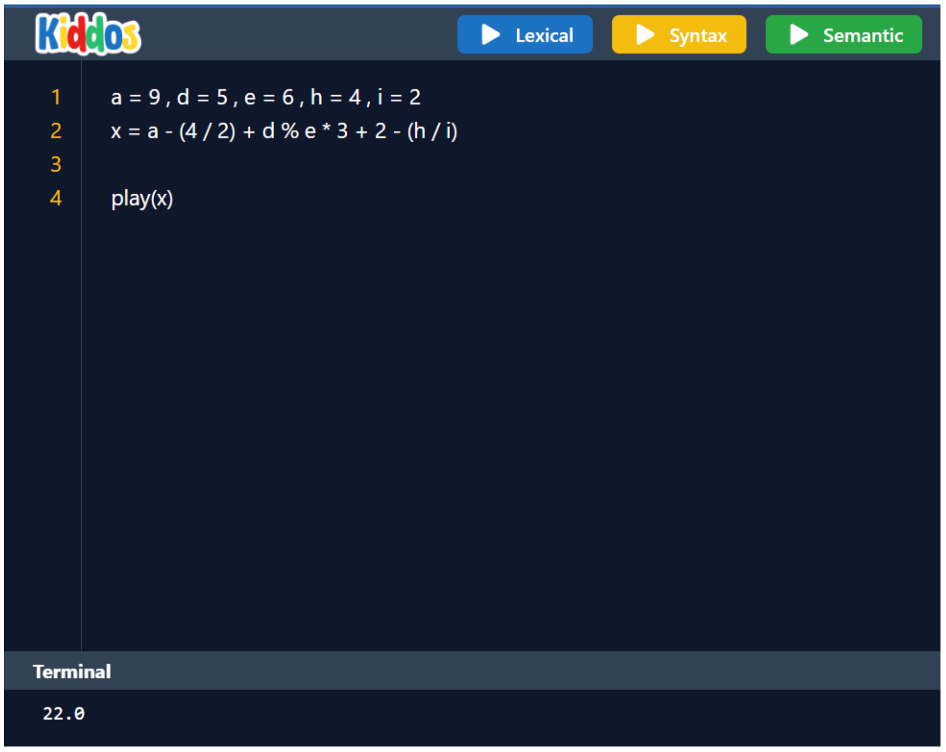
Program 2:



```
a = 6 , e = 2 , f = 0 , i = 5
y = 8 / 2 * a % 3 + e - f * 4 / 2 + i
play(y)
```

```
7.0
```

Program 3:



```
a = 9 , d = 5 , e = 6 , h = 4 , i = 2
x = a - (4 / 2) + d % e * 3 + 2 - (h / i)

play(x)
```

```
22.0
```