public class problem11

{

public static boolean check\_ab(String S)

{

int a\_counter = 0;

int b\_counter = 0;

for (int i = 0; i < S.length(); i++)

{

if ((S.charAt(i) == 'a') || (S.charAt(i) == 'A'))

{

a\_counter++;

}

if ((S.charAt(i) == 'b') || (S.charAt(i) == 'B'))

{

b\_counter++;

}

}

return (a\_counter == b\_counter);

}

public static void main(String[] args)

{

System.out.printf("check\_ab(\"hello\") = %b\n",

check\_ab("hello"));

System.out.printf("check\_ab(\"cat\") = %b\n",

check\_ab("cat"));

System.out.printf("check\_ab(\"Barbados\") = %b\n",

check\_ab("Barbados"));

System.out.printf("check\_ab(\"ALL BREAD and butter\") = %b\n",

check\_ab("ALL BREAD and butter"));

}

}

import java.io.File;

import java.util.\*;

public class problem12

{

public static boolean check\_ab(String S)

{

int a\_counter = 0;

int b\_counter = 0;

for (int i = 0; i < S.length(); i++)

{

if ((S.charAt(i) == 'a') || (S.charAt(i) == 'A'))

{

a\_counter++;

}

if ((S.charAt(i) == 'b') || (S.charAt(i) == 'B'))

{

b\_counter++;

}

}

return (a\_counter == b\_counter);

}

public static boolean check\_ab\_in\_file(String filename)

{

ArrayList<String> lines = read\_file(filename);

String text = "";

for (int i = 0; i < lines.size(); i++)

{

text = text + lines.get(i);

}

boolean result = check\_ab(text);

return result;

}

public class problem13

{

public static int find\_N(int number)

{

int N = 0;

while(true)

{

int current = (int) (Math.pow(2.0, N) + Math.pow(3.0, N));

if (current > number)

{

return -1;

}

if (current == number)

{

return N;

}

N++;

}

}

public static void main(String[] args)

{

System.out.printf("find\_N(2) = %d\n", find\_N(2));

System.out.printf("find\_N(4) = %d\n", find\_N(4));

System.out.printf("find\_N(5) = %d\n", find\_N(5));

System.out.printf("find\_N(10) = %d\n", find\_N(10));

System.out.printf("find\_N(13) = %d\n", find\_N(13));

}

}

import java.util.\*;

public class problem14

{

public static int[] subarray\_sums(int[][] items)

{

int[] result = new int[items.length];

for (int i = 0; i < items.length; i++)

{

int sum = 0;

for (int j = 0; j < items[i].length; j++)

{

sum = sum + items[i][j];

}

result[i] = sum;

}

return result;

}

public static void print\_array(int[] numbers)

{

System.out.printf("{%d", numbers[0]);

for (int i = 1; i < numbers.length; i++)

{

System.out.printf(", %d", numbers[i]);

}

System.out.printf("}\n");

}

public static void main(String[] args)

{

int[][] input = {{10, 5, 3}, {3, 1}};

int[] result = subarray\_sums(input);

System.out.printf("subarray\_sums({{10, 5, 3}, {3, 1}} = ");

print\_array(result);

}

}

public class problem15

{

public static int[] pick\_elements(int[] numbers, int[] positions)

{

int[] result = new int[positions.length];

for (int i = 0; i < positions.length; i++)

{

result[i] = numbers[positions[i]];

}

return result;

}

public static void print\_array(int[] numbers)

{

System.out.printf("{%d", numbers[0]);

for (int i = 1; i < numbers.length; i++)

{

System.out.printf(", %d", numbers[i]);

}

System.out.printf("}\n");

}

public static void main(String[] args)

{

int[] numbers = {10, 5, 3, 20, 30};

int[] positions = {3, 1};

System.out.printf("pick\_elements({10, 5, 3, 20, 30}, {3, 1}) = ");

print\_array(pick\_elements(numbers, positions));

int[] numbers2 = {10, 5, 3, 20, 30};

int[] positions2 = {0, 4, 1};

System.out.printf("pick\_elements({10, 5, 3, 20, 30}, {0, 4, 1}) = ");

print\_array(pick\_elements(numbers2, positions2));

}

}

public class problem16

{

public static int[] insert(int[] numbers, int position, int value)

{

int[] result = new int[numbers.length + 1];

for (int i = 0; i < position; i++)

{

result[i] = numbers[i];

}

result[position] = value;

for (int i = position; i < numbers.length; i++)

{

result[i+1] = numbers[i];

}

return result;

}

public static void print\_array(int[] numbers)

{

System.out.printf("{%d", numbers[0]);

for (int i = 1; i < numbers.length; i++)

{

System.out.printf(", %d", numbers[i]);

}

System.out.printf("}\n");

}

public static void main(String[] args)

{

int[] numbers = {10, 5, 3, 20, 30};

System.out.printf("insert({10, 5, 3, 20, 30}, 0, 11) = ");

print\_array(insert(numbers, 0, 11));

System.out.printf("insert({10, 5, 3, 20, 30}, 4, 11) = ");

print\_array(insert(numbers, 4, 11));

}

}

public class problem17

{

public static int a\_after\_star(String s)

{

int first\_star = -1;

for (int i = 0; i < s.length(); i++)

{

if (s.charAt(i) == '\*')

{

first\_star = i;

break;

}

}

if (first\_star == -1)

{

return 0;

}

int counter = 0;

for (int i = first\_star + 1; i < s.length(); i++)

{

if (s.charAt(i) == 'a')

{

counter++;

}

}

return counter;

}

public static void main(String[] arg)

{

System.out.printf("a\_after\_star(\"ab\*ab\*ab\") = %d\n",

a\_after\_star("ab\*ab\*ab"));

System.out.printf("a\_after\_star(\"a cat\*chases after its tail\") = %d\n",

a\_after\_star("a cat\*chases after its tail"));

System.out.printf("a\_after\_star(\"a cat\*chases after\*its tail\") = %d\n",

a\_after\_star("a cat\*chases after\*its tail"));

}

}

public class problem18

{

public static int a\_between\_stars(String s)

{

int first\_star = -1;

for (int i = 0; i < s.length(); i++)

{

if (s.charAt(i) == '\*')

{

first\_star = i;

break;

}

}

if (first\_star == -1)

{

return 0;

}

int counter = 0;

for (int i = first\_star + 1; i < s.length(); i++)

{

if (s.charAt(i) == '\*')

{

break;

}

if (s.charAt(i) == 'a')

{

counter++;

}

}

return counter;

}

public static void main(String[] arg)

{

System.out.printf("a\_between\_stars(\"ab\*ab\*ab\") = %d\n",

a\_between\_stars("ab\*ab\*ab"));

System.out.printf("a\_between\_stars(\"a cat\*chases after its tail\") = %d\n",

a\_between\_stars("a cat\*chases after its tail"));

System.out.printf("a\_between\_stars(\"a cat\*chases after\*its tail\") = %d\n",

a\_between\_stars("a cat\*chases after\*its tail"));

}

}

import java.util.\*;

import java.io.File;

public class problem19

{

public static void print\_towns(String filename)

{

ArrayList<String> lines = read\_file(filename);

for (int i = 0; i < lines.size(); i++)

{

String line = lines.get(i);

String[] fields = line.split("[0123456789]");

String town = fields[1];

System.out.printf("%s\n", town);

}

}

public static void main(String[] args)

{

print\_towns("towns.txt");

}

}

public class problem20

{

public static boolean check\_sorted(int[] a)

{

if (a.length < 1)

{

return true;

}

for (int i = 1; i < a.length; i++)

{

if (a[i] < a[i-1])

{

return false;

}

}

return true;

}

public static void main(String[] args)

{

int[] a1 = {20, 10, 20, 20, 20};

boolean result = check\_sorted(a1);

System.out.printf("check\_sorted(a1) = %b\n", result);

int[] a2 = {1, 1, 1, 2};

result = check\_sorted(a2);

System.out.printf("check\_sorted(a2) = %b\n", result);

}

}

public class problem21

{

public static boolean check\_squares(int[] a)

{

boolean result = false;

for (int i = 0; i < a.length; i++)

{

int n = a[i];

for (int j = 0; j < a.length; j++)

{

if (n\*n == a[j])

{

return true;

}

}

}

return false;

}

public static void main(String[] args)

{

boolean result;

int[] a1 = {1, 1, 1, 2};

result = check\_squares(a1);

System.out.printf("check\_squares(a1) = %b\n", result);

int[] a2 = {20, 10, 20, 20, 20};

result = check\_squares(a2);

System.out.printf("check\_squares(a1) = %b\n", result);

int[] a3 = {20, 100, 2, 10, 20, 20, 20};

result = check\_squares(a3);

System.out.printf("check\_squares(a1) = %b\n", result);

}

}

import java.util.\*;

import java.io.File;

public class problem22

{

public static String[][] read\_spreadsheet(String filename)

{

ArrayList<String> lines = read\_file(filename);

int rows = lines.size();

// The row below creates an array of length "rows", that stores

// objects of type String[]. Those objects are initialized to null.

String[][] result = new String[rows][];

for (int i = 0; i < lines.size(); i++)

{

String line = lines.get(i);

String [] values = line.split(",");

result[i] = values;

}

return result;

}

public static ArrayList<String> read\_file(String filename)

{

File temp = new File(filename);

Scanner input\_file;

ArrayList<String> result = new ArrayList<String>();

try

{

input\_file = new Scanner(temp);

}

catch (Exception e)

{

System.out.printf("Failed to open file %s\n",

filename);

return result;

}

while(input\_file.hasNextLine())

{

String line = input\_file.nextLine();

result.add(line);

}

input\_file.close();

return result;

}

public static int count\_equal(String filename, int col1, int col2)

{

String[][] values = read\_spreadsheet(filename);

int counter = 0;

for (int line = 0; line < values.length; line++)

{

String[] line\_values = values[line];

if ((line\_values.length <= col1) || (line\_values.length <= col2))

{

continue;

}

if (line\_values[col1].equals(line\_values[col2]))

{

counter++;

}

}

return counter;

}

public static void main(String[] args)

{

System.out.printf("count\_equal(\"file1.txt\", 0,1) = %d\n",

count\_equal("file1.txt", 0,1));

System.out.printf("count\_equal(\"file1.txt\", 0,5) = %d\n",

count\_equal("file1.txt", 0,5));

System.out.printf("count\_equal(\"file1.txt\", 1,4) = %d\n",

count\_equal("file1.txt", 1,4));

System.out.printf("count\_equal(\"file1.txt\", 1,3) = %d\n",

count\_equal("file1.txt", 1,3));

}

}

Problem23

public static double column\_average(String[][] values, int col)

{

double column\_sum = 0;

double column\_count = 0;

for (int line = 0; line < values.length; line++)

{

String[] line\_values = values[line];

if (line\_values.length <= col)

{

continue;

}

try

{

double value = Double.parseDouble(line\_values[col]);

column\_sum += value;

column\_count++;

}

catch(Exception e)

{

continue;

}

if (column\_count == 0)

{

return 0;

}

}

return column\_sum / column\_count;

}

public static double largest\_average(String filename)

{

String[][] values = read\_spreadsheet(filename);

if (values.length == 0)

{

return 0;

}

double largest = 0;

for (int col = 0; col < values[0].length; col++)

{

double current = column\_average(values, col);

if (current > largest)

{

largest = current;

}

}

return largest;

}

public static void main(String[] args)

{

System.out.printf("%f\n", largest\_average("file2.txt"));

}

}

Problem 24

public static int[] max\_length\_position(String filename)

{

String[][] values = read\_spreadsheet(filename);

int max\_length = 0;

int max\_row = 0;

int max\_col = 0;

for (int row = 0; row < values.length; row++)

{

String[] line\_values = values[row];

for (int col = 0; col < line\_values.length; col++)

{

int len = line\_values[col].length();

if (len > max\_length)

{

max\_length = len;

max\_row = row;

max\_col = col;

}

}

}

int[] result = new int[2];

result[0] = max\_row;

result[1] = max\_col;

return result;

}

public static void main(String[] args)

{

int[] result = max\_length\_position("file2.txt");

System.out.printf("%d, %d\n", result[0], result[1]);

}

}

public class problem25

{

public static void print\_combinations(String[] array1, String[] array2)

{

for (int i = 0; i < array1.length; i++)

{

for (int j = 0; j < array2.length; j++)

{

System.out.printf("%s %s\n", array1[i], array2[j]);

}

}

}

public static void main(String[] args)

{

String[] a1 = {"red", "white", "green", "blue"};

String[] a2 = {"shirt", "pants", "shoes"};

print\_combinations(a1, a2);

}

}

public class problem26

{

public static void print\_2d\_array(int[][] numbers)

{

System.out.printf("{");

for (int i = 0; i < numbers.length; i++)

{

if (i != 0)

{

System.out.printf(" ");;

}

System.out.printf("{");

for (int j = 0; j < numbers[i].length; j++)

{

System.out.printf("%5d", numbers[i][j]);

if (j != numbers[i].length -1)

{

System.out.printf(",");;

}

}

System.out.printf("}");

if (i == numbers.length -1)

{

System.out.printf("}");;

}

System.out.printf("\n");

}

}

public static int[][] multiplication\_table(int k)

{

if (k < 0)

{

return null;

}

int[][] result = new int[k+1][k+1];

for (int i = 0; i <= k; i++)

{

for (int j = 0; j <= k; j++)

{

result[i][j] = i\*j;

}

}

return result;

}

public static void main(String[] args)

{

print\_2d\_array(multiplication\_table(3));

}

}

public class problem27

{

public static void print\_2d\_array(int[][] numbers)

{

System.out.printf("{");

for (int i = 0; i < numbers.length; i++)

{

if (i != 0)

{

System.out.printf(" ");;

}

System.out.printf("{");

for (int j = 0; j < numbers[i].length; j++)

{

System.out.printf("%5d", numbers[i][j]);

if (j != numbers[i].length -1)

{

System.out.printf(",");;

}

}

System.out.printf("}");

if (i == numbers.length -1)

{

System.out.printf("}");;

}

System.out.printf("\n");

}

}

public static int[][] subarray\_sums(int[] array)

{

int len = array.length;

int[][] result = new int[len][len];

for (int i = 0; i < len; i++)

{

for (int j = 0; j < len; j++)

{

result[i][j] = 0;

for (int k = i; k <= j; k++)

{

result[i][j] += array[k];

}

}

}

return result;

}

public static void main(String[] args)

{

int[] a1 = {7, 3, 8, 1, 2};

int[][] result = subarray\_sums(a1);

print\_2d\_array(result);

}

}