/\*\*

\* Mathbot is a complex chatbot that has the capability to carry a conversation, as well as answer mathmatical quetions.

\* This version:

\* <ul><li>

\* Uses advanced search for keywords

\* </li></ul>

\*

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\* @version November 2016

\*/

import java.util.Scanner;

import java.util.stream.\*;

import java.io.\*;

import java.awt.Color;

import java.awt.Dimension;

import java.awt.Graphics;

import java.awt.Graphics2D;

import java.util.Random;

import javax.swing.JFrame;

import javax.swing.JPanel;

import java.awt.Graphics;

import java.awt.Graphics2D;

import java.awt.geom.Line2D;

public class Mathbot

{

/\*\*

\* Get a default greeting

\*

\* @return a greeting

\*/

public String getGreeting()

{

return "Hello, I am MathBot!" +" \*/" + "Ask me any math question or enter in a random letter to hear a math pun!";

}

/\*\*

\* Gives a response to a user statement, generally math-based

\*

\* @param statement

\* the user statement

\* @return a response based on the rules given

\*/

public String getResponse(String statement)

{

String response = "";

if (statement.length() == 0)

{

response = "You have to ask a question to get an answer.";

}

else if (findKeyword(statement, "add") >= 0

|| (findKeyword(statement, "plus") >= 0)

|| (findKeyword(statement, "+") >= 0))

{

Scanner user\_input = new Scanner(System.in);

String num1;

System.out.println("Give me one of the numbers to add?");

num1 = user\_input.next();

double x = Integer.parseInt(num1);

String num2;

System.out.println("What is it added to?");

num2 = user\_input.next();

double y = Integer.parseInt(num2);

double z = x + y;

System.out.println("The answer is " + z);

}

else if (findKeyword(statement, "minus") >= 0

|| (findKeyword(statement, "subtract") >= 0))

{

Scanner user\_input = new Scanner(System.in);

String num1;

System.out.println("Give me the original number?");

num1 = user\_input.next();

double x = Integer.parseInt(num1);

String num2;

System.out.println("What is subtracted from it?");

num2 = user\_input.next();

double y = Integer.parseInt(num2);

double z = y - x;

System.out.println("The answer is " + z);

}

else if (findKeyword(statement, "multiply") >= 0

|| (findKeyword(statement, "times") >= 0)

|| (findKeyword(statement, "\*") >= 0))

{

Scanner user\_input = new Scanner(System.in);

String num1;

System.out.println("Give me the first number?");

num1 = user\_input.next();

double x = Integer.parseInt(num1);

String num2;

System.out.println("What is it multiplied to?");

num2 = user\_input.next();

double y = Integer.parseInt(num2);

double z = y \* x;

System.out.println("The answer is " + z);

}

else if (findKeyword(statement, "divide") >= 0

|| (findKeyword(statement, "division") >= 0)

|| (findKeyword(statement, "\*") >= 0))

{

Scanner user\_input = new Scanner(System.in);

String num1;

System.out.println("Give me the original number?");

num1 = user\_input.next();

double x = Integer.parseInt(num1);

String num2;

System.out.println("What is it divided by?");

num2 = user\_input.next();

double y = Integer.parseInt(num2);

double z = x / y;

System.out.println("The answer is " + z);

}

else if (findKeyword(statement, "root") >= 0)

{

Scanner user\_input = new Scanner(System.in);

String num1;

System.out.println("What root?");

num1 = user\_input.next();

double x = Integer.parseInt(num1);

String num2;

System.out.println("What is the radicand?");

num2 = user\_input.next();

double y = Integer.parseInt(num2);

double a = 1 / x;

double z = Math.pow(y,a);

System.out.println("The answer is " + z);

}

else if (findKeyword(statement, "hypotenuse") >= 0)

{

Scanner user\_input = new Scanner(System.in);

String num1;

System.out.println("What is the length of Side A?");

num1 = user\_input.next();

double x = Integer.parseInt(num1);

String num2;

System.out.println("What is the length of Side B?");

num2 = user\_input.next();

double y = Integer.parseInt(num2);

double a = Math.pow(x,2);

double b = Math.pow(y,2);

double c = a + b;

double z = Math.pow(c,.5);

System.out.println("The hypotenuse is " + z);

}

else if (findKeyword(statement, "area") >= 0)

{

Scanner user\_input = new Scanner(System.in);

String num2;

System.out.println("What shape?");

num2 = user\_input.next();

if (findKeyword(num2, "triangle") >= 0)

{

String num3;

System.out.println("What is the base?");

num3 = user\_input.next();

double x = Integer.parseInt(num3);

String num4;

System.out.println("What is the height?");

num4 = user\_input.next();

double y = Integer.parseInt(num4);

double z = (x \* y)/2;

System.out.println("The area of the triangle is " + z);

}

if (findKeyword(num2, "circle") >= 0)

{

String num5;

System.out.println("What is the radius?");

num5 = user\_input.next();

double y = Integer.parseInt(num5);

double a = Math.pow(y,2);

double z = Math.PI \* a;

System.out.println("The area of the circle is " + z);

}

if (findKeyword(num2, "rectangle") >= 0

|| (findKeyword(num2, "square") >= 0))

{

String num3;

System.out.println("What is the width?");

num3 = user\_input.next();

double y = Integer.parseInt(num3);

String num4;

System.out.println("What is the height?");

num4 = user\_input.next();

double x = Integer.parseInt(num4);

double z = x \* y;

System.out.println("The area of the shape is " + z);

}

else

{

response = "Unfortunately, my database is not equipped to deal with that kind of area";

}

}

else if(findKeyword(statement, "mean") >= 0

|| (findKeyword(statement, "average") >= 0))

{

int sum = 0, inputNum;

int counter;

float mean;

Scanner NumScanner = new Scanner(System.in);

Scanner charScanner = new Scanner(System.in);

System.out.println("Enter the total number of terms whose mean you want to calculate");

counter = NumScanner.nextInt();

System.out.println("Please enter " + counter + " numbers:");

for(int x = 1; x<=counter ;x++){

inputNum = NumScanner.nextInt();

sum = sum + inputNum;

System.out.println();

}

mean = sum / counter;

System.out.println("The mean of the " + counter + " numbers you entered is " + mean);

}

else if (findKeyword(statement,"derive") >= 0)

{Scanner scan = new Scanner(System.in);

System.out.print("Enter how many terms: ");

int numOfFriends = Integer.parseInt(scan.nextLine());

//Create a string array to store the names of your friends

String arrayOfNames[] = new String[numOfFriends];

String arrayOfPower[] = new String[numOfFriends];

String q = " ";

String r = " ";

String s = " ";

String w = " ";

String wo = " ";

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

System.out.print("Enter the coefficient of term " + (i+1) + " : ");

arrayOfNames[i] = scan.nextLine();

System.out.print("Enter the power of term " + (i+1) + " : ");

arrayOfPower[i] = scan.nextLine();

if (i == 0){

int z = Integer.parseInt(arrayOfNames[0]);

int e = Integer.parseInt(arrayOfPower[0]);

q = ("(" + (z \* e) + "x^" + (e - 1) + ")");

}

else if (i == 1){

int a = Integer.parseInt(arrayOfNames[1]);

int f = Integer.parseInt(arrayOfPower[1]);

r = ("+ (" + (a \* f)+ "x^" + (f -1) + ")");

}

else if (i == 2){

int b = Integer.parseInt(arrayOfNames[2]);

int g = Integer.parseInt(arrayOfPower[2]);

s = ("+ (" + (b \* g) + "x^" + (g -1) + ")");

}

else if (i == 3){

int d = Integer.parseInt(arrayOfNames[3]);

int j = Integer.parseInt(arrayOfPower[3]);

w = ("+ (" + (d \* j) + "x^" + (j - 1) + ")");

}

else if (i == 4){

int k = Integer.parseInt(arrayOfNames[4]);

int l = Integer.parseInt(arrayOfPower[4]);

wo = ("+ (" + (k \* l) + "x^" + (l - 1) + ")");

}

}

System.out.println("The derivative is" + q + r + s + w + wo);

}

else if (findKeyword(statement, "physics") >= 0

|| findKeyword(statement, "algebra") >= 0

|| findKeyword(statement, "geometry") >= 0

|| findKeyword(statement, "calculus") >= 0

|| findKeyword(statement, "trigonometry") >= 0)

{

response = "I know a lot about that! Can you be more specific?";

}

else

{

response = getRandomResponse();

}

return response;

}

/\*\*

\* Search for one word in phrase. The search is not case

\* sensitive. This method will check that the given goal

\* is not a substring of a longer string (so, for

\* example, "I know" does not contain "no").

\*

\* @param statement

\* the string to search

\* @param goal

\* the string to search for

\* @param startPos

\* the character of the string to begin the

\* search at

\* @return the index of the first occurrence of goal in

\* statement or -1 if it's not found

\*/

private int findKeyword(String statement, String goal,

int startPos)

{

String phrase = statement.trim();

// The only change to incorporate the startPos is in

// the line below

int psn = phrase.toLowerCase().indexOf(

goal.toLowerCase(), startPos);

// Refinement--make sure the goal isn't part of a

// word

while (psn >= 0)

{

// Find the string of length 1 before and after

// the word

String before = " ", after = " ";

if (psn > 0)

{

before = phrase.substring(psn - 1, psn)

.toLowerCase();

}

if (psn + goal.length() < phrase.length())

{

after = phrase.substring(

psn + goal.length(),

psn + goal.length() + 1)

.toLowerCase();

}

// If before and after aren't letters, we've

// found the word

if (((before.compareTo("a") < 0) || (before

.compareTo("z") > 0)) // before is not a

// letter

&& ((after.compareTo("a") < 0) || (after

.compareTo("z") > 0)))

{

return psn;

}

// The last position didn't work, so let's find

// the next, if there is one.

psn = phrase.indexOf(goal.toLowerCase(),

psn + 1);

}

return -1;

}

/\*\*

\* Search for one word in phrase. The search is not case

\* sensitive. This method will check that the given goal

\* is not a substring of a longer string (so, for

\* example, "I know" does not contain "no"). The search

\* begins at the beginning of the string.

\*

\* @param statement

\* the string to search

\* @param goal

\* the string to search for

\* @return the index of the first occurrence of goal in

\* statement or -1 if it's not found

\*/

private int findKeyword(String statement, String goal)

{

return findKeyword(statement, goal, 0);

}

/\*\*

\* Pick a default response to use if nothing else fits.

\*

\* @return a non-committal string

\*/

private String getRandomResponse()

{

final int NUMBER\_OF\_RESPONSES = 10;

double r = Math.random();

int whichResponse = (int) (r \* NUMBER\_OF\_RESPONSES);

String response = "";

if (whichResponse == 0)

{

response = "Algebra can never keep a girl, it has too many x's";

}

else if (whichResponse == 1)

{

response = "I hate college algebra, its thought process is so linear";

}

else if (whichResponse == 2)

{

response = "Hey, if you're cold, you should stand in a corner - it's 90 degrees";

}

else if (whichResponse == 3)

{

response = "If a man graduates with a math major from college, would he get a degree or a radian?";

}

else if (whichResponse == 4)

{

response = "What is the Illuminati's favorite school subject? Trigonometry.";

}

else if (whichResponse == 5)

{

response = "There was once this mathmetician who had no money for lunch. He could binomial.";

}

else if (whichResponse == 6)

{

response = "When the statistics professor and the math professor wrote a cookbook together, they called it 'Pi A La Mode.";

}

else if (whichResponse == 7)

{

response = "What do organic mathematicians throw into their fireplaces? Natural Logs.";

}

else if (whichResponse == 8)

{

response = "The mathematician worked at home because he could only function in his domain.";

}

else if (whichResponse == 9)

{

response = "I used to think math was senseless, but then I realized decimals have a point.";

}

return response;

}

}