**CSC 3020 – Java Programming**

**Homework 2 – [your name]**

**25 points – Due May 31, 10am**

**Late deadline is May 19, 11:59pm, but 20% off**

**a)** Save this document with your name and the homework number somewhere in the file name.

**b)** Type/paste your answers into the document.

**c)** Submit this document and your .java file(s) to the Blackboard item where you downloaded this document. Do not submit a zip file but individually attach your files.

**1) [8 points]** Write regular expressions after the ► to validate the following strings:

**a)** An International Standard Book Number (ISBN). This is a unique 13-digit number assigned to each edition of a book. An ISBN contains hyphens. Here is a sample: 978-3-16-148410-0. Assume that each digit is in the range 0-9.

**► String regex = "^(?:ISBN(?:-13)?:? )?(?=[0-9]{13}$|(?=(?:[0-9]+[- ]){4})[- 0-9]{17}$)  
97[89][- ]?[0-9]{1,5}[- ]?[0-9]+[- ]?[0-9]+[- ]?[0-9]$";**

**b)** A chemical symbol of an element from the Periodic Table.

►  **String regex = A[cglmrstu]|B[aehikr]?|C[adeflmnorsu]?|D[bsy]|E[rsu]|F[elmr]?|G[ade]|H[efgos]?|I[nr]?|Kr?|L[airuv]|M[dgnot]|N[abdeiop]?|Os?|P[abdmortu]?|R[abefghnu]|S[bcegimnr]?|T[abcehilm]|U(u[opst]) ? | V | W| Xe | Yb ? | Z [nr] “ ;**

**c)** A measurement including a whole number and units separated by one space. A sample measurement is 34 oz. Assume that units is lower case letters only.

► **String regex = "([0-9]{2} [a-z]{2})";**

**d)** A two-character abbreviation for any of the eight US states or the Canadian province adjacent to the Great Lakes. Assume the abbreviation is upper case characters only.

►  **String regex = "([A-Z]{2})";**

**2) [9 points]** You've been hired by *Money Monarchs* to write a Java console application that converts between currencies US Dollar ($), Euro (€), and Japanese Yen (¥). Prompt the user for a conversion code:

| Code | Conversion | Last run input |
| --- | --- | --- |
| a | US Dollar → Euro | 32 |
| b | US Dollar → Japanese Yen | 64 |
| c | Euro → US Dollar | 200 |
| d | Euro → Japanese Yen | 300 |
| e | Japanese Yen → US Dollar | 24 |
| f | Japanese Yen → Euro | 28 |
| x | Exit |  |

Then prompt and get from the user a currency value. Convert the currency value and show the two values, rounded to two decimal places, with appropriate units. Continue to prompt the user for conversion codes until the sentinel value of ‘x’. Research the current conversion rates, and represent and use them as double constants. Locate the UNICODE values for units € and ¥, and represent and use them as string constants. They will be in the form "\uHHHH". Use the inputs shown in the table for the last six inputs.

*[your program code here]\**

**import java.util.\*;**

**public class Currency**

**{**

**public static void main(String args[])**

**{**

**char code='a';**

**double currency1,currency2;**

**//Gives constant for conversion values**

**final double CODEA=0.89;**

**final double CODEB=110.94;**

**final double CODEC=1.12;**

**final double CODED=124.10;**

**final double CODEE=0.01;**

**final double CODEF=0.01;**

**//Gives constants for currency symbols**

**final String USDOLLAR= "\u0024";**

**final String YEN= "\u20AC";**

**final String EURO= "\u00A5";**

**Scanner in=new Scanner(System.in);**

**while(code !='x')**

**{**

**//menu**

**System.out.print("\n a : US Dollar -> Euro ");**

**System.out.print("\n b : US Dollar -> Japanese Yen ");**

**System.out.print("\n c : Euro -> US Dollar ");**

**System.out.print("\n d : Euro->Japanese Yen ");**

**System.out.print("\n e : Japanese Yen -> US Dollar ");**

**System.out.print("\n f : Japanese Yen -> EURO ");**

**System.out.print("\n x : Exit ");**

**System.out.print("\n Enter appropriate CODE ");**

**code=in.next().charAt(0); //Enter the conversion code**

**if(code=='a') //Converts USD to Euro**

**{**

**System.out.print("\n Enter the value of currency in US Dollar : ");**

**currency1=in.nextDouble();**

**currency2=currency1\*CODEA;**

**System.out.printf("\n Conversion of US Dollar %.2f %s to EURO is %.2f %s ", currency1 ,USDOLLAR,currency2,EURO);**

**}**

**else if(code=='b') //Converts USD to Yen**

**{**

**System.out.print("\n Enter the value of currency in US Dollar : ");**

**currency1=in.nextDouble();**

**currency2=currency1\*CODEB;**

**System.out.printf("\n Conversion of US Dollar %.2f %s to Japanese Yen is %.2f %s ", currency1 ,USDOLLAR,currency2,YEN);**

**}**

**else if(code=='c') //Converts Euro to US Dollar**

**{**

**System.out.print("\n Enter the value of currency in Euro : ");**

**currency1=in.nextDouble();**

**currency2=currency1\*CODEC;**

**System.out.printf("\n Conversion of Euro %.2f %s to US Dollar is %.2f %s ", currency1 ,EURO,currency2,USDOLLAR);**

**}**

**else if(code=='d') //Converts Euro to US Yen**

**{**

**System.out.print("\n Enter the value of currency in Euro : ");**

**currency1=in.nextDouble();**

**currency2=currency1\*CODED;**

**System.out.printf("\n Conversion of Euro %.2f %s to Japanese Yen is %.2f %s ", currency1 ,EURO,currency2,YEN);**

**}**

**else if(code=='e') //Converts Yen to US Dollar**

**{**

**System.out.print("\n Enter the value of currency in US Japanese Yen : ");**

**currency1=in.nextDouble();**

**currency2=currency1\*CODEE;**

**System.out.printf("\n Conversion of Japanese Yen %.2f %s to US Dollar is %.2f %s ", currency1 ,YEN,currency2,USDOLLAR);**

**}**

**else if(code=='f') //Converts Yen to Euro**

**{**

**System.out.print("\n Enter the value of currency in US Japanse Yen : ");**

**currency1=in.nextDouble();**

**currency2=currency1\*CODEF;**

**System.out.printf("\n Conversion of Japanese yen %.2f %s to Euro is %.2f %s ", currency1 ,YEN,currency2,EURO);**

**}**

**}**

**}**

**}**

*[your program output here]\*\**

**Enter the value of currency in Euro : 200**

**Conversion of Euro 200.00 ¥ to US Dollar is 224.00 $**

**a : US Dollar -> Euro**

**b : US Dollar -> Japanese Yen**

**c : Euro -> US Dollar**

**d : Euro->Japanese Yen**

**e : Japanese Yen -> US Dollar**

**f : Japanese Yen -> EURO**

**x : Exit**

**Enter appropriate CODE d**

**Enter the value of currency in Euro : 300**

**Conversion of Euro 300.00 ¥ to Japanese Yen is 37230.00 €**

**a : US Dollar -> Euro**

**b : US Dollar -> Japanese Yen**

**c : Euro -> US Dollar**

**d : Euro->Japanese Yen**

**e : Japanese Yen -> US Dollar**

**f : Japanese Yen -> EURO**

**x : Exit**

**Enter appropriate CODE e**

**Enter the value of currency in US Japanese Yen : 24**

**Conversion of Japanese Yen 24.00 € to US Dollar is 0.24 $**

**a : US Dollar -> Euro**

**b : US Dollar -> Japanese Yen**

**c : Euro -> US Dollar**

**d : Euro->Japanese Yen**

**e : Japanese Yen -> US Dollar**

**f : Japanese Yen -> EURO**

**x : Exit**

**Enter appropriate CODE f**

**Enter the value of currency in US Japanse Yen : 28**

**Conversion of Japanese yen 28.00 € to Euro is 0.28 ¥**

**a : US Dollar -> Euro**

**b : US Dollar -> Japanese Yen**

**c : Euro -> US Dollar**

**d : Euro->Japanese Yen**

**e : Japanese Yen -> US Dollar**

**f : Japanese Yen -> EURO**

**x : Exit**

**Enter appropriate CODE**

**3) [8 points]** You've been hired by *Readability Ravens* to write a Java console application that analyzes a paragraph for readability using the Coleman–Liau index. Prompt the user for a paragraph, and then calculate and show the following:

● Number of characters.

● Number of whitespace characters.

● Number of non-whitespace characters.

● Number of sentences – these are delimited by periods (.).

● Number of words – these are delimited by one or more spaces, commas, and periods.

● Number of word letters.

● Coleman–Liau index – this is calculated as follows:

1) Count the number of sentences.

2) Count the number of words.

3) Count the number of letters in words.

4) Calculate L = Letters ÷ Words × 100.

5) Calculate S = Sentences ÷ Words × 100.

6) Calculate CLI = 0.0588L - 0.296S - 15.8.

Format the output in two columns with the first column containing a label and the second column containing a value. Format the CLI to two decimal places. To test your program, use paragraph:

Existing computer programs that measure readability are based largely upon subroutines which estimate number of syllables, usually by counting vowels. The shortcoming in estimating syllables is that it necessitates keypunching the prose into the computer. There is no need to estimate syllables since word length in letters is a better predictor of readability than word length in syllables. Therefore, a new readability formula was computed that has for its predictors letters per 100 words and sentences per 100 words. Both predictors can be counted by an optical scanning device, and thus the formula makes it economically feasible for an organization such as the US Office of Education to calibrate the readability of all textbooks for the public school system.

You should get the following stats:

Characters: 765

Whitespace characters: 118

Non-whitespace characters: 647

Sentences: 5

Words: 119

Word letters: 639

L: 536.97

S: 4.20

CLI: 14.53

Use this paragraph for the last run:

Apollo 11 was the spaceflight that landed the first two humans on the Moon. Mission commander Neil Armstrong and pilot Buzz Aldrin, both American, landed the lunar module Eagle on July 20, 1969. Armstrong became the first to step onto the lunar surface six hours later on July 21. Aldrin joined him about 20 minutes later. They spent about two and a quarter hours together outside the spacecraft, and collected lunar material to bring back to Earth. Michael Collins piloted the command module Columbia alone in lunar orbit while they were on the Moon's surface. Armstrong and Aldrin spent just under a day on the lunar surface before rendezvousing with Columbia in lunar orbit.

*[your program code here]\**

**import java.util.Scanner;**

**import java.util.StringTokenizer;**

**public class Coleman\_Liau**

**{**

**public static void main(String args[])**

**{**

**Scanner sc = new Scanner(System.in);**

**System.out.println("Enter the paragraph : ");**

**String paragraph = sc.nextLine();**

**int words = 0;**

**int chars = 0;**

**int spaces = 0;**

**int nonspaces = 0;**

**int sentences = 0;**

**int word\_letters = 0;**

**chars += paragraph.length(); //Counts number of characters**

**words += new StringTokenizer(paragraph, " ,.-?").countTokens(); //counting number of words**

**for(char c : paragraph.toCharArray())**

**{**

**if(c==' ')**

**spaces++; //Counts amount of spaces**

**if((c>='A' && c<='Z')||(c>='a' && c<='z'))**

**word\_letters++; //Counts amount of words**

**}**

**nonspaces = paragraph.length() - spaces; //Counts non spaces**

**sentences = paragraph.split("[.]").length; //Counts number of sentences**

**double L = ((double)word\_letters / (double)words) \* 100;**

**double S = ((double)sentences / (double)words) \* 100;**

**double CLI = 0.0588 \* L - 0.296 \* S - 15.8; //Calcultes coleman liau index**

**System.out.println("Number of Characters : "+chars);**

**System.out.println("Number of Whitespaces : "+spaces);**

**System.out.println("Number of Non-Whitespaces : "+nonspaces);**

**System.out.println("Number of Sentences : "+sentences);**

**System.out.println("Number of Words : "+words);**

**System.out.println("Number of Word Letters : "+word\_letters);**

**System.out.println("Coleman–Liau index : "+CLI);**

**}**

**}**

*[your program output here]\*\**

\* **Copying-and-pasting application code to a Word document**

1) From the program editor window, press **CTRL-A** and press **CTRL-C**.

2) From within the Word document, press **CTRL-V**.

\*\* **Copying-and-pasting application output to a Word document**

1) From the Eclipse main screen, maximize the Console window.

2) From the Console window, press **ALT-PrintScreen**.

3) From within the Word document, press **CTRL-V**.