Final Exam: COMP217001/07 Java Programming, spring 2019. Gil-Jin Jang

4 pages (sides) / Total 5 problems / 100 points

Student ID: _____

Name: _____

Time: 6/18 (Wed) 11:00-12:50

※ Directions:
- ■ Submit this sheet at the end of the exam as a proof that you attended the exam.
- ■ Submit your codes (**.java** files only) to http://lms.knu.ac.kr (assignment section)
  - ◆ Your code should be compiled with no errors
  - ◆ If you make any assumption on the problems, please leave them in the code as comments.

1. [15pts] (Your submission: **TV1.java**) Complete the class TV0 and its extended class TV1.
    A. Template: **TV1_template.java**

2. [20pts] (Your Submission: **CountAlphabet.java**) Count number of letters of a file. Write a program that read a file from a URL, http://websitetips.com/articles/copy/lorem/ipsum.txt, then count the number of Alphabet letters (case-insensitive) in this file

   • Case-insensitive: for example, 'A' and 'a' are the same.

   A. Template: **CountAlphabet_template.java**

```
/* OUTPUT */
$ java CountAlphabet
-----------------------------------------------------
 A,a B,b C,c D,d E,e F,f G,g H,h I,i J,j K,k L,l M,m
 284  37  93 163 381  13  51   7 270   9  18 179 202
-----------------------------------------------------
-----------------------------------------------------
 N,n O,o P,p Q,q R,r S,s T,t U,u V,v W,w X,x Y,y Z,z
 154 270  71  23 200 245 321 223  44   4   4  22   5
-----------------------------------------------------
```

3. [20pts] (submission: **TestShapePerimeter.java**)
Design classes `Rectangle`, `Parallelogram`, `Trapezoid`, and `Diamond` inherited from an abstract class `Quadrangle`, which is also inherited from class `Shape`.
The abstract method `getPerimenter()` should be defined in all the three classes.
Complete the given code template.
   A. Template: **TestShapePerimeter_template.java**

```
/* OUTPUT */
$ java TestShapePerimeter
Perimeter of [Rectangle,W:3.0,H:4.0] is 14.00
Perimeter of [Parallelogram,W:5.0,H:6.0,A:0.167pie] is 34.00
Perimeter of [Trapezoid,W:8.0,H:4.0,Wtop:2.0] is 20.00
Perimeter of [Diamond,W:6.0,H:8.0] is 20.00
```

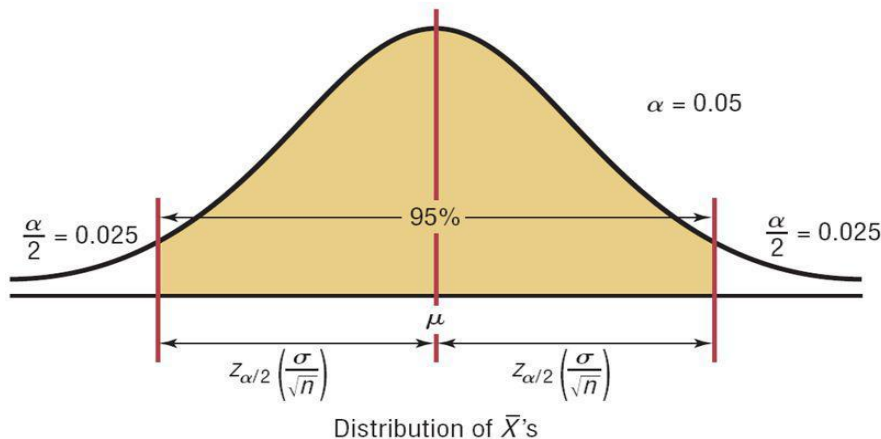4. [25pts] (submission: **FindStatisticsAdvanced.java**)
In statistics, the sample mean is computed by $\mu = E[X] = \frac{1}{N}\sum_{n=1}^{N} x[n]$, and standard

deviation is defined by $\sigma = \sqrt{E[(X - E[X])^2]} = \sqrt{\frac{1}{N}\sum_{n=1}^{N}(x[n] - \mu)^2}$.

The 95% confidence interval of a normal distribution is $[\mu \pm 1.96\sigma]$.

Write a program that read a file of integers, and f ind maximum, minimum, mean, standard deviation, and the values outside of mean +/- 1.96 standard deviation.

95% Confidence Interval of the Mean

$\alpha = 0.05$

$\frac{\alpha}{2} = 0.025$ 95% $\frac{\alpha}{2} = 0.025$

μ

$z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$ $z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$

Distribution of $\bar{X}$'s

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A. Template: **FindStatisticsAdvanced_template.java**

```
/* OUTPUT */
$java FindStatisticsAdvanced normal10.txt
Maximum = 388
Minimum = -262
mean = 31.20
standard deviation = 175.14
Values outside of mean +/ -1.96*std (-312.08, 374.48):
388
$ java FindStatisticsAdvanced normal100.txt
Maximum = 276
Minimum = -179
mean = 56.63
standard deviation = 94.94
Values outside of mean +/ -1.96*std (-129.46, 242.72):
-179 276 257 266
$ java FindStatisticsAdvanced normal200.txt
Maximum = 338
Minimum = -253
mean = 48.43
standard deviation = 107.44
Values outside of mean +/ -1.96*std (-162.15, 259.00):
321 -183 -187 -164 283 289 -197 -173 -253 286 -247 328 300 338
```

5. [20pts] (submission: **TestCustomizableCar.java**)

Complete the given TestCustomizableCar_template.java

Write your own test method (main).