# **Assignment 03 Algorithmic Design Document**

Make a copy before you begin (File -> Make a copy). Add the Assignment # above and complete the sections below BEFORE you begin to code and submit with your Assignment to D2L (File -> Download -> PDF). The sections will expand as you type.

## zyBooks

Add your zyBooks screenshots for the % and assigned zyLabs completions below. Required percentages: all assigned zyLabs, Challenge Activity with at least 70%, and Participation Activity with at least 80%.

|  |
| --- |
| **zyLabs, Challenge, and Participation % Screenshot:** |
|  |

|  |
| --- |
| **Assigned zyLabs completion Screenshot:** |
|  |

## Assignment

|  |
| --- |
| **Program description:** |
| Program Jelly Bean Stats |

Before you begin coding, **you must first plan out the logic** and think about what data you will use to test your program for correctness. All programmers plan before coding - this saves a lot of time and frustration! Use the steps below to identify the inputs and outputs, calculations, and steps needed to solve the problem.

|  |
| --- |
| **Algorithmic design:** |
| 1. Identify all of the user input. What are the data types of the inputs? Define the input variables. |
| double volumeOfSingleBean = 0.0;  double beanLength = 0.0;  double beanHeight = 0.0;  double lgBeanLength = 0;  double lgBeanHeight = 0;  int volumeOfJar = 0;  int lgVolumeJar = 0;  int beansInJar = 0;  int entries = 0;  int totalBeans = 0;  int mostBeans = 0;  float avgBeans = 0.0; |
| 1. Describe the program output. What is displayed to the user? What are the data types of the output? Define the output variables. |
| This program will output to the user the number of estimated jelly beans in a jar, so long as the user continues to enter inputs other than the sentinel value “0 0 0”. Once the user enters the sentinel value, the program exits and outputs a final stat sheet to the user including:   1. Total number of entries 2. Average number of beans 3. Bean size for the largest jelly bean estimate 4. Jar size for the largest jelly bean estimate   Here is an example program run:  // Welcome message  Welcome to my Jelly Bean estimate program!!  // Prompt user for input  Enter jelly bean length (cm), jelly bean height, and jar size separated by space:  1.52 .9 500  // Display beans in jar  Estimate of jelly beans in the jar: 462  // Loop repeated  Enter jelly bean length (cm), jelly bean height, and jar size separated by space: 2.0 1.0 25  Estimate of jelly beans in the jar: 14  // Loop repeated  Enter jelly bean length (cm), jelly bean height, and jar size separated by space: 2.5 .5 200  Estimate of jelly beans in the jar: 364  // Sentinel value “0 0 0” entered to exit program  Enter jelly bean length (cm), jelly bean height, and jar size separated by space: 0 0 0  // Status calculated and output to user  Total number of entries: 3  Average number of beans: 280  Bean size for the largest jelly bean estimate: 1.52 cm and 0.9 cm  Jar size for the largest jelly bean estimate: 500 ml  Thank you for using my program. |
| 1. What calculations do you need to do to transform inputs into outputs? List all formulas needed, if applicable. If there are no calculations needed, state there are no calculations for this algorithm. |
| Formula for the volume of a single jelly bean:  **( 5 \* PI \* beanLength \* beanHeight ^ 2 ) / 24**  Formula to calculate number of beans that fit in the given jar volume:  **volumeOfJar \* LOADFACTOR / volumeOfSingleBean**  Average number of beans in jar:  **totalBeans / entries** |
| 1. Design the logic of your program using pseudocode or flowcharts. Here is where you would use conditionals, loops, functions or array constructs (if applicable) and list the steps in transforming inputs into outputs. Walk through your logic steps with the test data from the assignment document. |
| **While user does NOT enter sentinel value of “0 0 0”, repeat these commands:**   1. Accept input from user: jelly bean length, jelly bean height, jar volume 2. Calculate single jelly bean volume: ( 5 \* PI \* beanLength \* beanHeight ^ 2 ) / 24 3. Calculate number of beans that fit in given jar volume: volumeOfJar \* LOADFACTOR / volumeOfSingleBean   **When user does enter sentinel value of “0 0 0”:**   1. Output:    1. Total number of entries    2. Average number of beans    3. Bean size for the largest jelly bean estimate    4. Jar size for the largest jelly bean estimate 2. Exit program. |
| 1. Include 2 Sample Program Runs for your program using your own set of data. This data set must be different from my Sample Runs in the Assignment document. This process is similar to Unit Testing and will help you test your program better. |
| **Sample Program Run 1:**  Welcome to my Jelly Bean estimate program!!  Enter jelly bean length (cm), jelly bean height, and jar size separated by space:  3.25 .5 400  Estimate of jelly beans in the jar: 560  Enter jelly bean length (cm), jelly bean height, and jar size separated by space: 1.5 .75 500  Estimate of jelly beans in the jar: 674  Enter jelly bean length (cm), jelly bean height, and jar size separated by space: 2.25 .45 340  Estimate of jelly beans in the jar: 849  Enter jelly bean length (cm), jelly bean height, and jar size separated by space: 0 0 0  Total number of entries: 3  Average number of beans: 694  Bean size for the largest jelly bean estimate: 2.25 cm and 0.45 cm  Jar size for the largest jelly bean estimate: 500 ml  Thank you for using my program.  **Sample Program Run 2:**  Welcome to my Jelly Bean estimate program!!  Enter jelly bean length (cm), jelly bean height, and jar size separated by space:  1.25 .6 300  Estimate of jelly beans in the jar: 758  Enter jelly bean length (cm), jelly bean height, and jar size separated by space: 2.75 .5 400  Estimate of jelly beans in the jar: 662  Enter jelly bean length (cm), jelly bean height, and jar size separated by space: 3.25 .6 200  Estimate of jelly beans in the jar: 194  Enter jelly bean length (cm), jelly bean height, and jar size separated by space: 0 0 0  Total number of entries: 3  Average number of beans: 538  Bean size for the largest jelly bean estimate: 1.25 cm and 0.6 cm  Jar size for the largest jelly bean estimate: 400 ml  Thank you for using my program. |