**Stack Operations**

**Project Description**

Complete the SPIM program in the startup file, “***AreaVolume.s”***, so that it computes both the ***surface area*** and the ***volume*** of a cylinder with given dimensions for the ***cylinder radius*** and the ***cylinder height***. You are given a Java-like (actually the syntax for C) program which serves as both documentation and an abstract view for your SPIM program.

|  |
| --- |
| **volume = PI \* radius2 \* height**  surface = 2\* PI \* radius2 + 2 \* PI \* radius \* height, or  **surface = (radius + height) \* 2 \* radius \*PI** |

For ***volume,*** the assignment statement is already reduced to a sequence of macro steps.

* Expand each macro step, by inserting the definition of that macro from your macro library of macros, and then fix the formal parameters with the actual arguments.

For ***area***, you need to

* Reduce the assignment statement and expression to the correct sequence of macro steps, The requirements are as follows:
  + The order of the operands in the macro steps must follow exactly the order of the operands in the expression, and
  + Operations are performed as soon as it is legitimate.
* Expand each macro step, by inserting the definition of that macro from your macro library of macros, and then fix the formal parameters with the actual arguments.

**What to hand in**

Submit an electronic copy to blackboard and a printed copy in class of the following:

* A Word document called ***AreaVolume.docx*** containing:
  + A copy of your **program source** code, from ***AreaVolume.s***
  + Extracted from the log file at the end of execution:
    - A copy of the **data segment** (label the data)