

Homework Assignment #1

Reading Assignment:

Read Chapters 1-3 in C++ for Scientists & Engineers, 3rd Edition, by Bronson

Problem Assignment:

Submit each of the following by the assigned due date.

- 1) (45 pts) Work the following problems in the textbook. Be sure to write out the instructions for each problem and include the given information. Work all parts for each problem unless otherwise noted.
 - 2) Exercise 2.4 – Problems 2,3,4,5 (only parts a,c,e,f in each problem)
 - 3) Exercise 2.5 – Problems 1,4,6
 - 4) Exercise 3.2 – Problems 6,7
 - 5) Exercise 3.3 – Problem 2,3

- 2) (25 pts) Fill in the answers in the boxes provided below for each part.

For the following exercises determine if each is a valid string literal. If it is not, give a reason.

Problem	Valid? (Y / N)	If not valid, why?
1. "X"		
2. "123"		
3. "don't"		
4. "12 + 34"		
5. IS"		
6. "\$1.98"		
7. "\"A\"B"		
8. "Say \"AH\""		

For the following exercises find the value of integer A after executing the two instructions shown.

Problem	Result
9. A = 7; A += 4;	
10. A = 7; A -= 4;	
11. A = 7; A /= 4;	
12. A = 7; A %= 4;	
13. A = 7; A++;	
14. A = 7; A--;	

Write C++ expressions to compute each of the following quantities (it is not necessary to declare each variable).

Problem	C++ expression
15. x equals the square root of $a + 3b^2$	
16. x equals the square root of the average of m and n	
17. $y = 2.5e^{-1.12 \times 10^5 t} \sin(2\pi t)$	
18. C equals the integer above the ratio of A / B	
19. $y = \sin[\cos^{-1}(\alpha)]$	
20. $y = e^{\alpha + \beta} + \sin(\alpha + \beta)$	
21. $y = \frac{1}{ a + b } \cdot c + d$	
22. $y = \tan^2 \left[\frac{x}{\pi} + z \right]$	
23. $y = \cos^{-1}(x + \ln(z))$	
24. $y = \left(\frac{x}{z} \right)^{n+1}$	
25. $y = \sqrt[3]{z + \sqrt{w}}$	

3) Write C++ programs for each of the following. For each program:

- Use the TCC template (see next page). Complete the items listed in the template.
- Include plenty of comments.
- The output should be neatly and clearly formatted.
- Use good programming style and proper indentation.
- Turn in a printout of the program and printouts for all required test cases.

A) Write a program to calculate the volume and surface area (including the ends) of a cylinder. Units are not required.

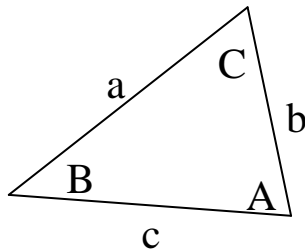
- Inputs: radius of cylinder
- Outputs: volume and surface area, where $v = \pi r^2 h$ and $s = 2\pi r(r+h)$. Display the results using 5 digits after the decimal point.
- Testing: Run the program for the three cases shown below.

Case	r	h
1	5	10
2	25	5
3	3.6×10^4	1.8×10^5

B) Write a program to calculate the three angles (A, B, and C) for a triangle given the three sides (a, b, and c) using the law of cosines, as illustrated below. Units are not required for the sides.

- Use the TCC template
- Inputs: sides a, b, and c (units are not required)
- Outputs: angles A, B, and C (add the word **degrees** after each angle) and display 1 digit after the decimal point.
- Turn in a printout of the program and printouts for all required test cases.
- Testing: Run the program for the three cases shown below:

Case	a	b	c
1	20	15	10
2	5	12	13
3	200	100	250



Law of Cosines

$$a^2 = b^2 + c^2 - 2 \cdot b \cdot c \cdot \cos(A)$$

Example :

If a = 20, b = 15, c = 10, then

$$20^2 = 15^2 + 10^2 - 2 \cdot (15) \cdot (10) \cdot \cos(A)$$

$$A = \cos^{-1} \left(\frac{15^2 + 10^2 - 20^2}{2 \cdot (15) \cdot (10)} \right)$$

A = 104.5°

Template for C++ programs (save as template.cpp) – use for all programs

```
//
//      /-----/ \-----/ \-----/
//      / / \ / \ / \ / \ / \ / \ /
//      / / \ / \ / \ / \ / \ / \ /
//
// Date:
// Name:
// Project:
// Inputs:
// Outputs:
// Program Description:
//
//
//*****

#include <iostream> //header containing cout and cin

using namespace std; //introduces namespace std needed to use cout and cin

int main ( void )
{
    return 0;
}
```