EGR 125 Name: _____
Introduction to Engineering Methods (C++) Due Date: _____
File: N125H1

Homework Assignment #1

Reading Assignment:
Read Chapter 3 in Programming In C++, by D'Orazio
Work Exercises 3.1 – 3.6 (not to be submitted, but good practice for tests)

Problem Assignment:
Submit each of the following by the assigned due date.

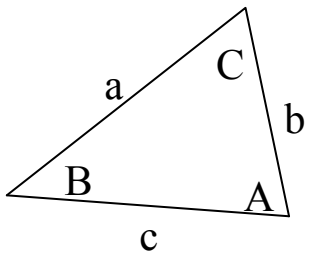
1) Write C++ programs for each of the following. For each program:
   - Use the TCC template assigned in Labs #1-2
   - Include plenty of comments
   - The output should be neatly and clearly formatted
   - Turn in a printout of the program and printouts for all required test cases.

   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 $s = 2\pi r(r+h)$
      - Testing: Run the program for r = 5, h = 10 and for r = 25, h = 5

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.
      - Inputs: sides a, b, and c
      - Outputs: angles A, B, and C (add the word ***degrees*** after each angle)
      - Testing: Run the program for the following cases:

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

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

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

$$A = 104.5°$$

2) Complete the attached worksheets.

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For the following exercises, determine if each is a valid C++ identifier. If it is not, give a reason.

Problem	Valid? (Y/N)	If N, why?
1. night		
2. full Name		
3. PS.172		
4. ngiht		
5. netDistance		
6. 3ABC		
7. ToTaL		
8. return		
9. sum		
10. m123$		

For the following exercises, use a check mark in the correct column to classify each as an integer literal, a real literal, or neither. If the answer is neither, give a reason.

Problem	literal			If Neither, why?
	Integer	Real	Neither	
11. 12				
12. 0.357E4				
13. 67.				
14. five				
15. 3 + 7				
16. 3,528				
17. '4'				
18. +45				

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?
19. "X"		
20. "123"		
21. "don\'t"		
22. "12 + 34"		
23. "constant"		
24. IS"		
25. "$1.98"		
26. "\"A"\"B		
27. "Say \"AH\""		

For the following exercises find the value of each expression, or explain why it is not a valid expression.

Problem	Result
28. 2 / 3 + 3 / 5	
29. (2 + 3) % 2	
30. 7 % 5 % 3	
31. ceil(8.0 / 5.0)	
32. 25 / (1 / 2)	
33. 2.0 / 4	
34. sqrt (pow (4.0,2))	
35. ((12 + 3) / 2) / (8 - (5 + 1))	
36. -3.0 * 5.0	
37. 9.0 / 2 / 5	
38. 9 / 2 / 5.0	

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

Problem	Result
39. A = 7; A += 4;	
40. A = 7; A -= 4;	
41. A = 7; A /= 4;	
42. A = 7; A %= 4;	
43. A = 7; A++;	
44. A = 7; A--;	

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

Problem	C++ expression
45. x equals the square root of $a + 3b^2$	
46. x equals the square root of the average of *m* and *n*	
47. $y = 2.5e^{-1.12x10^5 t}\sin(2\pi t)$	
48. C equals the integer above the ratio of A / B	
49. $y = \sin[\cos^{-1}(\alpha)]$	
50. $y = e^{\alpha+\beta} + \sin(\alpha+\beta)$	
51. $y = \frac{1}{\lvert a+b\rvert}\cdot c + d$	
52. $y = \tan^2\left[\frac{x}{\pi} + z\right]$	
53. $y = \cos^{-1}\left(x + \ln(z)\right)$	
54. $y = \left(\frac{x}{z}\right)^{n+1}$	
55. $y = \sqrt[3]{z + \sqrt{w}}$	