

EGR 125
Introduction to Engineering Methods (C++)
File: N125-Ch2LB

Name: _____
Due Date: _____

Chapter 2 Homework

Reading Assignment:

Read Chapter 1-2 in Introduction to Programming with C++, 3rd Edition, by Liang

Problem Assignment:

Submit each of the following by the assigned due date.

- 1) (30 pts) Work the following problems in the textbook. Work each problem by hand (not using the compiler). 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) Checkpoint Exercises 2.4, p. 35
 - 3) Checkpoint Exercises 2.11, 2.12, 2.13 (using the % operator), and 2.15 on p. 45
 - 4) Checkpoint Exercises 2.23 and 2.24 on p. 52

- 2) (30 pts) Fill in the answers in the boxes provided on the following worksheet. Turn in the worksheet along with parts 1 and 3 to this assignment.

2A) 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. 'Yes'		
2. "1_1"		
3. "\"quotation\""		
4. "3+4=5"		
5. "c:\\EGR125\\Files\\"		
6. \$2.50		
7. \"Compile\"		
8. "Say \"Hello\""		

2B) For the following exercises find the value of integer A after executing the instructions shown.

Problem	Result
9. A = 8; A += 3;	
10. A = 14; A /= 3;	
11. A = 14; A %= 3;	
12. A = 5; A++;	
13. B = 5; A = B--;	
14. B = 5; A = --B;	
15. A = 7+4*6-2	
16. A = (7+4)*6-2	
17. A = 7+4*(6-2)	
18. A = (7+4)*(6-2)	
19. A = 4E6/25E-2	

2C) Write C++ expressions to compute each of the following quantities (it is not necessary to declare each variable).

Problem	C++ expression
20. H equals the square root of $A^2 + B^2$	
21. Area = $\frac{1}{2}(\text{Base})(\text{Height})$	
22. $V = 6.5e^{-25t} \cos(2\pi t)$	
23. Electron charge = -1.6022×10^{-19} (use scientific notation, not an exponent)	
24. $y = 3\cos[\tan^{-1}(a)]$	
25. $y = \log_{10}(2^{10})$	
26. $y = \frac{10e^{-1.2}}{ a+b }$	
27. $y = 4\cos^2\left[\frac{2\pi}{3}\right]$	
28. $y = \sin^{-1}(4x + \ln(2))$	
29. $y = \left(\frac{2}{3}\right)^{n+1}$	
30. $y = \sqrt[3]{\ln(45)}$	

- 3) (40 pts) 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 for **Programming Exercise 2.20 (slope of a line)** on p. 69 in the textbook.

- Testing: Run the program for the three cases shown below (the first case is the example provided with the problem in the text).
- Display the result in the format indicated in the textbook problem.

Case	x1	y1	x2	y2
1	4.5	-5.5	6.6	-6.5
2	-1.5	2.5	4.5	-7.5
3	Pick any example with (x1,y1) in the 2 nd quadrant and (x2,y2) in the 4 th quadrant			

B) Write a program for **Programming Exercise 2.7 (convert minutes to years and days)** on p. 66 in the textbook.

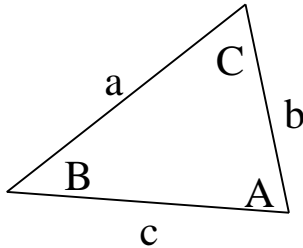
- Testing: Run the program for the three cases shown below (the first case is the example provided with the problem in the text).
- Display the result in the format indicated in the textbook problem.

Case	Number of Minutes
1	1000000000
2	Any 4 digit number
3	Any 6 digit number

C) Write a program to calculate the remaining one side and two angles for a triangle given two sides and one opposite angle using the **law of sines**, as illustrated below. Units are not required for the sides.

- Use the TCC template
- Inputs: sides a, b, and angle A (in degrees)
- Outputs: angles B and C and side c (add the word **degrees** after each angle)
- Turn in a printout of the program and printouts for all required test cases.
- Testing: Run the program for the three cases shown below (answers shown for Case 1 in example below):

Case	a	b	A
1	20	10	30°
2	7.5	10.5	40°
3	100	100	60°



Law of Sines

$$\frac{\sin(A)}{a} = \frac{\sin(B)}{b} = \frac{\sin(C)}{c}$$

Example :

If a = 20, b = 10, and A = 30° then

$$\frac{\sin(30^\circ)}{20} = \frac{\sin(B)}{10}$$

$$\text{so } B = \sin^{-1}\left[10 \cdot \frac{\sin(30^\circ)}{20}\right] = 14.48^\circ$$

$$C = 180 - A - B = 180 - 30 - 14.48 = 135.52^\circ$$

$$\frac{\sin(30^\circ)}{20} = \frac{\sin(135.52^\circ)}{c}$$

$$\text{so } c = \frac{20 \cdot \sin(135.52^\circ)}{\sin(30^\circ)} = 28.03$$

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 ()
{
    return 0;
}
```