Make sure to write down your procedure clearly and answer exactly what the problem is asking for. Points will be taken off for incomplete, unintelligible, and sloppy procedures and solutions. Include comments in all C programs.

Follow the five step problem solving in engineering and science whenever required.

Conversions. These set of problems involves converting a value in one unit to a value in another unit. Each program should prompt the user for a value in the specified units and then print the converted value, along with the new units.

(20 points) 2.21. Write a C program to convert miles to kilometers. (Recall that 1 mi = 1.6093440 km.)

Areas and Volumes. These problems involve computing an area or a volume using input from the user. Each program should include a prompt to the user to enter the variables needed.

(20 points) 2.28. Write a C program to compute the area of a rectangle with sides a and b. (Recall that A = a × b.)

Amino Acid Molecular Weights. The amino acids in proteins are composed of atoms of oxygen, carbon, nitrogen, sulfur, and hydrogen, as shown in the following table.

Element	Atomic Weight
Oxygen	15.9994
Carbon	12.011
Nitrogen	14.00674
Sulfur	32.066
Hydrogen	1.00794

The molecular weights of the individual elements are described in textbook (shown below). The molecular weight is computed by multiplying the atomic weight by the molecules and adding them up.

Amino Acid	O	C	N	S	H
Alanine	2	3	1	0	7
Arginine	2	6	4	0	15
:	:	:	:	:	:
Glycine	2	2	1	0	5
Histidine	2	6	3	0	10
:	:	:	:	:	:
Valine	2	5	1	0	11

(20 points) 2.37. Write a C program to compute and print the molecular weight of glycine.

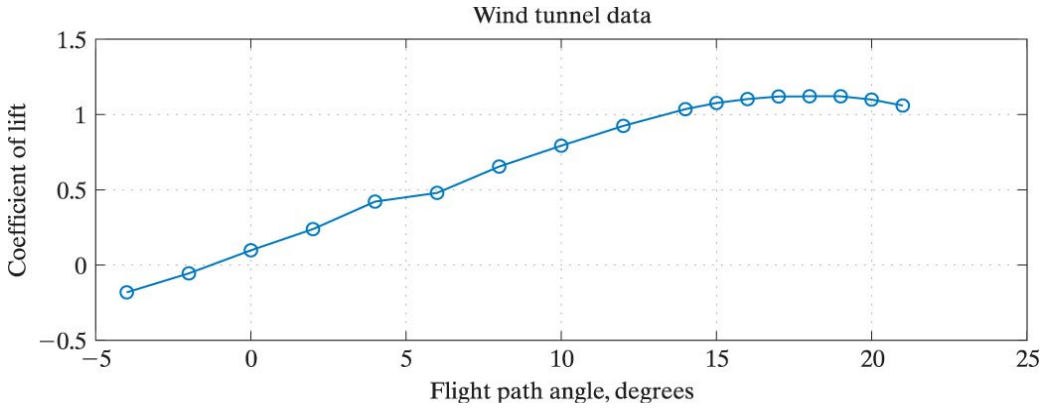
Logarithms to the Base b. To compute the logarithm of x to base b, we can use the following relationship:

$$log_b x = \frac{log_e x}{log_e b}$$

(20 points) 2.41. Write a C program that reads a positive number and then computes and prints the logarithm of the value to base 2. For example, the logarithm of 8 to base 2 is 3 because $2^3 = 8$.

Wind Tunnels. A wind tunnel is a test chamber built to generate different wind speeds, or Mach numbers (which is the wind speed divided by the speed of sound). Accurate scale models of aircraft can be mounted on force-measuring supports in the

test chamber, and then measurements of the forces on the model can be made at many different wind speed and angles. At the end of an extended wind tunnel test, many sets of data have been collected and can be used to determine the coefficients of lift, drag, and other aerodynamic performance characteristics of the new aircraft at its various operational speeds and positions. Data collected from a wind tunnel test are plotted in the following figure and are listed in a table in the text book.



Flight-Path Angle (degrees)	Coefficient of Lift
-4	-0.182
-2	-0.056
0	0.097
2	0.238
4	0.421
6	0.479
8	0.654
:	:
20	1.099
21	1.059

(20 points) 2.43. Assume that we would like to use linear interpolation to determine the coefficients of lift for additional flight-path angles that are between -4 degrees and 21 degrees. Write a program that allows the user to enter the data for two points and a flight-path angle between those points. The program should then compute the corresponding coefficient of lift.