

Structure of a Program Lab

Problem 1: Write a program `inspire.c` to inspire your fellow students to be successful in their future career. When the program is executed, it shall have the following conversation. The contents inside a pair of bracket [] are from the user at the prompt. The contents inside a pair of braces { } are output.

```
What is your name? USER_NAME
Hello USER_NAME, I enjoy computing, what type of hobbies do you like? USER_HOBBY
USER_HOBBY sounds really fun.
What would you like to be in the future? USER_WORK
You should definitely try and be a USER_WORK. Good Luck!
```

Problem 2: One mile equals 1.609 kilometers. Write a program `mile2km.c` to take the user input distance in miles and convert it to kilometers. The program accepts the user input for miles from the keyboard and displays the result on the screen.

Problem 3: Write a program `yogurt.c` for a Yogurt Shop to process the sale of frozen yogurt. The price for frozen yogurt is \$0.39 per ounce. The sales tax is 9.05 percent.

Problem 4: Write a program `icecream.c` for an Ice Cream Shop to process the sale of ice cream. The price for ice cream is \$0.47 per ounce. Compute the cost and apply a 10% discount. The sales tax is 8.5 percent of the adjusted subtotal cost.

Problem 5: A company pays its employees at the rate of \$25 per hour worked and withholds 30% of the gross pay for federal and state income tax. Write a program `payment.c` to calculate the gross pay, deducted tax, and net pay of an employee based on the hours worked as the user input.

Problem 6: Write a program `times2by2.c` that reads in two 2×2 matrices from the user and finds their product. The output needs to be a HTML page. Here is the formula for the product of two 2×2 matrices.

$$\begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix} \times \begin{pmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{pmatrix} = \begin{pmatrix} a_{11} \times b_{11} + a_{12} \times b_{21} & a_{11} \times b_{12} + a_{12} \times b_{22} \\ a_{21} \times b_{11} + a_{22} \times b_{21} & a_{21} \times b_{12} + a_{22} \times b_{22} \end{pmatrix}$$

Here is a **Teacher Example** to help with this problem. Write a program `add3by3.c` that reads in two 3×3 matrices from the user and finds their sum. The output needs to be a HTML page. Here is the formula for the sum of two 3×3 matrices.

$$\begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix} + \begin{pmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \\ b_{31} & b_{32} & b_{33} \end{pmatrix} = \begin{pmatrix} a_{11} + b_{11} & a_{12} + b_{12} & a_{13} + b_{13} \\ a_{21} + b_{21} & a_{22} + b_{22} & a_{23} + b_{23} \\ a_{31} + b_{31} & a_{32} + b_{32} & a_{33} + b_{33} \end{pmatrix}$$

Problem 7: Save the program `times2by2.c` as `times2by2v2.c`. Have this new program display the results from left to right instead of up and down.

Problem 8: Write a program `times3by3.c` that reads in two 3×3 matrices from the user and finds their product. You will need to look up formula for the product of two 3 by 3 matrices online.