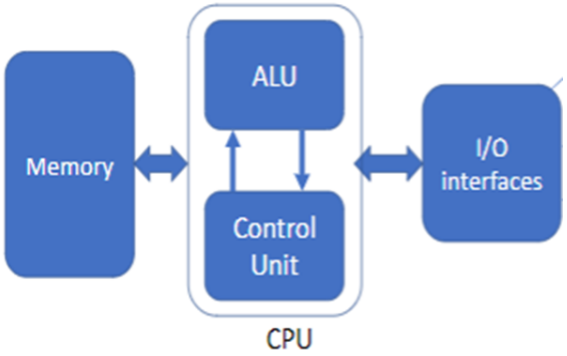
Some Practice Problems for Week 1

Try to answer the following questions **only after studying** all the lecture-contents. You may search the internet while solving these practice problems.

Q1. Consider the following pseudocode. Show how the computation-steps are executed on a von Neumann computer (code and figure shown below).

```
foo(){
        readIO a;
        readIO b;
        c =a +b;
        store c;
        d =a -b;
        print d;
}
```



Q2. With an example, explain the advantages of having registers inside CPU?

Q3. How are pointer variables related to the memory of a computer?

Q4. How are pointers and arrays related in C?

Q5. What does the following function perform?

```
void foo(int *px, int *py)
{
      int temp;
      temp = *px;
      *px = *py;
      *py = temp;
}
```

Q6. Consider little-endian representation of data. What will be the output of this program?

```c
int main(){
  int a[]={5,10,15,20};
  char *p;
  p = (char *) a;

  int i;
  for(i=0; i<5; i++)
     printf("%d ", *(p+i));

  return 0;
}
```

Q7. What will be the output of this program?

```c
int main(){
      float arr[5]={12.5,10.0,13.5,90.5,0.5};
      float *ptr1 = &arr[0];
      float *ptr2 = ptr1 + 3;
      printf("%f\n", *ptr2);
      printf("%d\n", ptr2-ptr1);
      return 0;
}
```

Q8. Consider little-endian representation of data. What will be the output of this program?

```c
int main(){
      int a;
      char *x;
      x = (char *) &a;
      a = 512;
      x[0] = 1;
      x[1] = 2;
      printf("%d\n", a);
      return 0;
}
```

Q9. What will be the output of this program?

```c
int main(){
      int a[5] = {1,2,3,4,5};
      int *ptr = (int*)(a+1);
      printf("%d %d", *(a+1), *(ptr-1));
      return 0;
}
```

Q10. How is the string “Hello World!” stored in the memory? How many bytes does this string consume in C?

Q11. What does the following function do with the two input string pointers?

```
void foo(char *s, char *t){
     int i = 0;

     while((s[i]=t[i]) != '\0')
          i++;
}
```

Q12. What does the following function do with the two input string pointers?

```
void foo(char *s, char *t){

     while ((*s = *t) != '\0'){
          s++; t++;
     }
}
```

Q13. What does the following function do with the two input string pointers?

```
void foo(char *s, char *t){
     while ((*s++ = *t++) != '\0')
          ;
}
```

Q14. Write a C program that prints the elements of a 2D matrix in column-major order (i.e., 1st column, then 2nd column, then 3rd column, and so on) using a pointer.

Q15. Write a C program that prints the elements of a 2D matrix in row-major order (i.e., 1st row, then 2nd row, then 3rd row, and so on) using a pointer.