Ahmad Ali Ahmad Othman - Section 1 - Sheet 6

Question (1)

Question (1-a)

Write a program to print the value of the address of the pointer to a variable whose value is input from user.

```cpp
#include <iostream>

using namespace std;

int main() {
    int x;
    int *ptr;

    cin >> x;
    ptr = &x

    printf("Value: %d, Address: %p\n", *ptr, ptr);
    return 0;
}
```

Question (1-b)

Write a program to print a number which is entered from keyboard using pointer.

```cpp
#include <iostream>

using namespace std;

int main() {
  int x;
  int *ptr;

  cin >> x;
  ptr = &x

  cout << *ptr << endl;
  return 0;
}
```

Question (1-c)

Write a function which will take pointer and display the number on screen. Take number from user and print it on screen using that function.

```cpp
#include <iostream>

using namespace std;

void printPtr(int *ptr) {
  cout << *ptr << endl;
}

int main() {
  int x; cin >> x;

  printPtr(&x);
  return 0;
}
```

Question (1-d)

Write a program that asks the user to enter integers as inputs to be stored in the variables `a` and `b` respectively.
There are also two integer pointers named `ptrA` and `ptrB`.
Assign the values of `a` and `b` to `ptrA` and `ptrB` respectively, and display them and print the after swapping two value.

```cpp
#include <iostream>

using namespace std;

int main() {
    int a, b; cin >> a >> b;
    int *ptrA = &a, *ptrB = &b;

    cout << "Before swap:" << endl;
    printf("ptrA: %d, ptrB: %d\n", *ptrA, *ptrB);

    int temp = *ptrA;
    *ptrA = *ptrB;
    *ptrB = temp;

    cout << "After swap:" << endl;
    printf("ptrA: %d, ptrB: %d\n", *ptrA, *ptrB);

    return 0;
}
```

Question (2)

Question (2-a)

Given the string "A string." Print on one line the letter on the index 0, the pointer position and the letter t. undate the pointer to pointer +2. Then, in another line print the pointer and the letters r and g of the

string (using the pointer).

```cpp
#include <iostream>
#include <string>

using namespace std;

int main() {
    char str[] = "A string";
    char *ptr = str;

    printf("%c %p %c\n", *ptr, ptr, ptr[3]);
    return 0;
}
```

Question (2-b)

Find max element in array using pointer

```cpp
#include <iostream>
using namespace std;

int main() {
  int n;
  cin >> n;

  int arr[100];
  for (int i = 0; i < n; i++) {
    cin >> arr[i];
  }

  int *maxPtr = arr;

  for (int i = 1; i < n; i++) {
    if (*(arr + i) > *maxPtr) {
      maxPtr = arr + i;
    }
  }

  cout << "Max value = " << *maxPtr << endl;
  cout << "Address = " << maxPtr << endl;

  return 0;
}
```

Question (2-c)

Print size of different data types using pointers

```cpp
#include <iostream>
using namespace std;

int main() {
  int a;
  float b;
  double c;
  char d;

  cout << sizeof(&a) << endl;
  cout << sizeof(&b) << endl;
  cout << sizeof(&c) << endl;
  cout << sizeof(&d) << endl;

  return 0;
}
```

Question (2-d)

Print and sum array elements using pointers

```cpp
#include <iostream>
using namespace std;

int main() {
  int n;
  cin >> n;

  int arr[100];
  for (int i = 0; i < n; i++) {
    cin >> arr[i];
  }

  int *p = arr;
  int sum = 0;

  for (int i = 0; i < n; i++) {
    cout << *(p + i) << " ";
    sum += *(p + i);
  }

  cout << endl;
  cout << "Sum = " << sum << endl;

  return 0;
}
```

Question (2) : Find the output of the following program:

A)

```cpp
#include <iostream>
using namespace std;

int main()
{
    int a = 32, *ptr = &a;
    char ch = 'A', &cho = ch;

    cho += a;
    *ptr += ch;
    cout << a << ", " << ch << endl;
    return 0;
}
```

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B)

```cpp
#include <iostream>
using namespace std;

int main()
{
    const int i = 20;
    const int* const ptr = &i;
    (*ptr)++;
    int j = 15;
    ptr = &j;
    cout << i;
    return 0;
}
```

Error: Incrementing a read-only variable.

```
file.cpp: In function 'int main()':
file.cpp:9:4: error: increment of read-only location '*(const int*)ptr'
    9 |    (*ptr)++;
      |    ~^~~~~
```

C)

```cpp
#include <iostream>
using namespace std;
int main()
{
    int arr[] = { 4, 5, 6, 7 };
    int* p = (arr + 1);
    cout << *arr + 10;
    return 0;
}
```

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D)

```cpp
#include <iostream>
using namespace std;
int main()
{
    int arr[] = { 4, 5, 6, 7 };
    int* p = (arr + 1);
    cout << *arr + 10;
    return 0;
}
```

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E)

```cpp
#include <iostream>
using namespace std;
int main()
{
    int a = 10, *pa, &ra;
    pa = &a;
    ra = a;
    cout << "a=" << ra;
    return 0;
}
```

Error: Declaration of reference variable requires an initializer

```
file.cpp: In function 'int main()':
file.cpp:6:21: error: 'ra' declared as reference but not initialized
    6 |    int a = 10, *pa, &ra;
      |                     ^~
```

F)

```cpp
using namespace std;
int main() {
    int num[5];
    int* p;
    p = num;
    *p = 10;
    p++;
    *p = 20;
    p = &num[2];
    *p = 30;
    p = num + 3;
    *p = 40;
    p = num;
    *(p + 4) = 50;
    for (int i = 0; i < 5; i++)
        cout << num[i] << ", ";
    return 0; }
```

```
10, 20, 30, 40, 50,
```