

ASSESSMENT COVER SHEET

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Assessment Title	Quiz 3
Unit Number and Title	HIT365
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Date Submitted	16/5/2014
Date Received	16/5/2014

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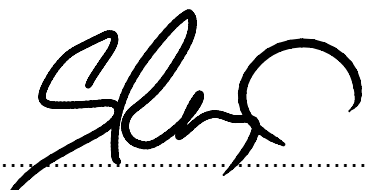
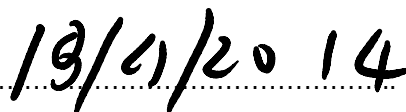
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Signed..........Date..........

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QUESTION 1

There are three integer variables `rock`, `paper` and `scissors` which have been initialized. Write code to swap the values in these variables around so that `rock` is given `paper`'s original value, `paper` is given `scissors`'s original value and `scissors` is given `rock`'s original value.

Response

```
/*
 * Question1.c
 * Created on: 16/05/2014
 * Author: Shane
 */

#include <stdio.h>
#include <stdlib.h>

void swap(int *ptr1, int *ptr2, int *ptr3);

int main(void){

    int rock = 1, paper = 2, scissors = 3;
    int *rockPtr, *paperPtr, *scissorsPtr;

    rockPtr = &rock;
    paperPtr = &paper;
    scissorsPtr = &scissors;

    printf("%d\n", *rockPtr);
    printf("%p\n\n", &rockPtr);
    printf("%d\n", *paperPtr);
    printf("%p\n\n", &paperPtr);
    printf("%d\n", *scissorsPtr);
    printf("%p\n\n", &scissorsPtr);

    swap(rockPtr, paperPtr, scissorsPtr);

    printf("%d\n", *rockPtr);
    printf("%p\n\n", &rockPtr);
    printf("%d\n", *paperPtr);
    printf("%p\n\n", &paperPtr);
    printf("%d\n", *scissorsPtr);
    printf("%p\n\n", &scissorsPtr);

    return 0;
}

void swap(int *ptr1, int *ptr2, int *ptr3){

    /* Store variable 1 address in temp1 */
    int temp1 = *ptr1;
    /* The object pointed to by ptr1 is assigned the value pointed to by ptr2 */
    *ptr1 = *ptr2;
    /* Store variable 2 in temp2 */
    int temp2 = *ptr3;
    /* The object pointed to by ptr3 is assigned the temp1 variable */
    *ptr3 = temp1;
    /* The object pointed to by ptr2 is assigned the temp2 variable */
    *ptr2 = temp2;

}
```

Hi Dr Kai

I know that I could have done this problem simply by using a temp variable and swapping the values of the variables this way, but I wanted to keep up my practice using pointers so I created a function which manipulates the pointers to the variable locations instead.

Sorry for the extended response.

Cheers

Shane.

QUESTION 2

There is a C array called `pair` containing two integers of unknown value.

Write code to check if the elements are in descending order, and if they are - swap them. For example if `pair` initially contains `[17, 8]`, after your code has executed it would contain `[8, 17]`. If `pair` initially contains `[12, 16]`, it would remain unchanged.

Response

```
/*
 * Question2.c
 * Created on: 16/05/2014
 * Author: Shane
 */

#include <stdio.h>

void swapArray(int array[2]);

int main(void){

    /* Initialise the array pair */
    int pair[2] = {12, 16};

    /* Print off the initial values in array */
    printf("%d%7d\n", pair[0], pair[1]);

    /* Test to see if the first element of the array is more than the second */
    if (pair[0] > pair[1]){
        /* If so, then call the swap function */
        swapArray(pair);
        /* Print the swapped array */
        printf("%d%7d\n", pair[0], pair[1]);
    }else{
        printf("The array doesn't need to be changed.");
    }

    return 0;
}

void swapArray(int array[2]){

    /* Temporarily store the first element of the array */
    int temp = array[0];

    /* Reassign the array elements */
    array[0] = array[1];
    array[1] = temp;
}
```

QUESTION 3

There are three C arrays: `oldList` which contains a list of unknown values of type integer type; `newList` which is of the same length as `oldList` but contains only 0s; and `indexes` which contains integers representing a number of valid indexes to elements of `oldList`.

Now consider the following code:

```
int oldList[5] = {1, 4, 5, 7, 9};
```

```
int newList[5] = {0, 0, 0, 0, 0};
```

- (a) What does `newList` contain after the above code has been executed?

```
newList contains 5 zeros in the array
```

- (b) What does `oldList` contain after the above code has been executed?

```
oldList contains the numbers 1, 4, 5, 7 and 9  
in the array
```

- (c) Write in the box below a program that copies `oldlist` to `newlist`;

Response

```
/*  
 * Question3.c  
 * Created on: 16/05/2014  
 * Author: Shane  
 */  
  
#include <stdio.h>  
  
int main(void){  
    int oldList[5] = {1, 4, 5, 7, 9};  
    int newList[5] = {0, 0, 0, 0, 0};  
    int i, n = sizeof(oldList)/sizeof(oldList[0]);  
  
    printf("%d\n\n", sizeof(oldList));  
  
    /* Copy the old list into the new list */  
    for (i = 0; i < n; i++){  
        newList[i] = oldList[i];  
    }  
  
    for (i = 0; i < n; i++){  
        /* Print the new list to check that it has done the job */  
        printf("%d ", newList[i]);  
    }  
  
    return 0;  
}
```

QUESTION 4

Suppose you had a C array of integers called `mirrors`. Write code that would print out every element of that array that had the same value as its index position. For example, given the array `{0, 2, 1, 3}`, the code would print the values: 0 and 3.

Response

```
/*
 * Question4.c
 * Created on: 16/05/2014
 * Author: Shane
 */

#include <stdio.h>

int main(void){

    int mirrors[4] = {0, 2, 1, 3};
    int i;

    /* Dynamically determine the size of the mirrors array */
    int n = sizeof(mirrors)/sizeof(mirrors[0]);

    for (i = 0; i < n; i++){

        /* Test each element to see if it is the same as its index */
        if (mirrors[i] == i){
            /* Print array element if true */
            printf("%d\n", mirrors[i]);
        }
    }

    return 0;
}
```

QUESTION 5

In this question, you are given two pieces of code which are the same, except for one line which differs in the two listings. In the second piece of code, a box replaces the code that differs in that listing. Each code segment is to perform a different task, as explained below.

The following code prints all the positive ELEMENTs in a given array of integers called `nums` or length `NLEN`:

```
#define NLEN 33
```

```
for (int index = 0; index < NLEN      ; index++) {
    if (nums[index] > 0) {
        printf("%d", nums[index]);
    }
}
```

Complete the following code to print the INDEXES of all the positive elements in that list.

```
for (int index = 0; index < NLEN; index++) {
    if (nums[index] > 0) {
        printf(
    }
}
```

`"%d\n", index`

Response

```
/*
 * Question5.c
 * Created on: 16/05/2014
 * Author: Shane
 */

#include <stdio.h>
#define NLEN 5

int main(void){

    int index;
    int nums[33] = {-1, 2, -3 , -4, 10};

    for (index = 0; index < NLEN; index++){
        if (nums[index] > 0) {
            printf("%d\n", index);
        }
    }

    return 0;
}
```