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| King Fahd university of petroleum & Minerals |
| ICS 103 Final Exam |
| For semester 102 |
| June 12, 2011

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| **Name** |  |
| **ID** |  |
| **Section Instructor** |  |
| **Section Number or class time** |  |

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| **Question 1** | **24** |  |
| **Question 2** | **36** |  |
| **Question 3** | **40** |  |
| **Total** | **100** |  |

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# Question 1: Find the output of each code block of the following

**24pts = 4 + 4 + 3 + 4 + 5 + 4**

|  |  |
| --- | --- |
| int A[8], n=8;for(i=0; i < n; i++) if (i%2==0) A[i] = 5\*i; else A[n-i] = -5\*i;for(i=0; i < n; i++) printf(“%d\n”,A[i]); | **0****-35****10****-25****20****-15****30****-5** |
| int x[] = {4,6};int y[] = {10,4};int i,j;for(i=0 ; i<2 ; i++){  for(j=0 ; j<2 ; j++) printf(“%d ”, x[i] \* y[j]); printf(“\n”);} | **40 16****60 24** |
| char names[][80] = {“Good Morning”, “Hello”, “Hi”};int i;for(i=0; i<2; i++)printf(“%d %c\n”,strlen(names[i]), names[i][2] ); | 12 o5 l |
| int A[8] = {2,1,3,6,5};int j = 7,i;for(i=0 ; i<=7 ; i++) printf("%d ", A[j] - A[i]);  | **-2 -1 -3 -6 -5 0 0 0** |
| char str[] = “This is interesting”;char delims[] = “i”;char \*token; token = strtok( str, delims );while ( token != NULL ) { puts(token); token = strtok( NULL, delims );} | **Th****s****s****nterest****ng** |
| void fun(int \*a, int \*b, int c, int d){ int x; x=\*a; \*a = c; d = \*b; c = x; }int main(void){ int p=10,q=15,r=20, s=25; fun(&p, &q, r, s); printf("%d %d %d %d", p, q, r, s); printf("\n");} | **20 15 20 25** |

# Question 2 (36 pts = 3 pts each): Choose the correct answer of the following multiple choice questions

**Answer Key -- A**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| E | C | D | C | B | E | C | A | D | D | A | B |

**Answer Key -- B**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| D | B | A | D | C | A | D | B | C | E | A | B |

# Question 3 (40pts):

**1. (10pts) Complete the following recursive binary search function so that it returns the index of the array element when found or -1 if not found.**

int BinarySearch(double data[],double key,int start, int end, int size){

 if( start > end ) //2 pts

 return -1; //the key was not found in the array

 int middle = (start + end) / 2 ; //2pts

 if( array[middle] == key )

 return middle; //2pts

 else

 if(array[middle] < key)

 return BinarySearch(data, key, middle + 1, end, size); //2pts

 else if(array[middle] > key)

 return BinarySearch(data, key, start, middle – 1, size );

 //2pts

 }

//if student got mixed up between the two recursive calls : for example looked in the other half of the array then -2pts. If the student got ONE parameter in the call wrong, then -1pts. For example BS(data, key, middle, end, size) 🡪 -1pts

**2. (6pts) Complete the program function *FixMe*() given below. Its purpose is to change any digit found in its string parameter to '$'. For example, if the string parameter has the value "ICS 103 IS FUN", then after executing the function it will have the value "ICS $$$ IS FUN"**

**In addition, answer why we should remove the return statement below**

void FixMe(char[] A){

 int i;

 for(i=0; i<strlen(A) ;i++) //also A[i] !=’\0’ 2pts

 if(isdigit(A[i])) //also A[i] >= '0' && A[i] <= '9' works 2pts

 A[i] ='$';

return A;// This statement should be removed because A

Acceptable Answers : 2pts

Because arrays are passed by reference.

Because arrays are pointer variables.

}

**3. (6pts ) Complete the following function so that it returns the first index within the array of strings “*sentences*”, that contain the string “*key*”. If the “*key*” was not found in any of the “*sentences*”, -1 should be returned. For example, the word “Today is Sunday” contains “Sun”.**

int find\_key(char sentences[][LENGTH], char key[LENGTH], int size)

{

 int i,j;

 for(i=0 ; i<size ; i++)

 {

 if( strstr(sentences[i],key) != NULL )//2pts

 {

 return i;//2pts

 }

 }

 return -1 ;//2pts

}

**4. (6pts) Complete the following function so that it swaps its two arguments. The two arguments for this function are strings.**

void swap\_strings(char A[] , char B[])//1 pts

{

 char temp[LENGTH]; //also including length as a passed parameter is okay. //0.5pts

 strcpy(temp, A); //1.5pts

strcpy(A, B); //1.5pts

 strcpy(B, temp); //1.5pts

}

**5. (6 pts) Complete the following function so that it finds the sum of each column of its argument (2D array) and returns the result as a 1-D array. Assume the type is double.**

void sum\_columns(int A[][COLS] , int sum\_cols[], int rows, int cols) {

 int i,j;

 for(i=0; i < cols; i++) //1.5pts

 {

 sum\_cols[i]=0; //1.5pts

for(j=0 ; j<rows ; j++) //1.5 pts

 {

 sum\_cols[i] += A[j][i]; //1.5 pts

 }

 }

}

**6.** **(6pts) Complete the following code fragment so that it will find how many capital letters are in the list of strings shown in the initialization**.

int i,j,count;

char text[4][80] = {"THis is ics 103","Final EXam","TErm 102","Good Luck"};

count = 0;//1pt

for(i=0; i<4 ;i++) { //1pt

 for(j=0; j<strlen(text[i]) ;j++) //1pt

 if (isupper(text[i][j]))//1pt

 count++; //1pt

}

printf("Count = %d",count); //print the result (1pt)