SE185: Problem Solving in Software Engineering

Midterm 1: Thursday (10-07-21)

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| Last Name: Nichols | First Name: Miles | Lab Section: 1 |

1. **True/False Questions (10 x 1p each = 10p)**

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| --- | --- | --- | --- |
| 1. The following statement is valid:   char Exam1[2][2] = {{‘2’, ‘4’}, {‘A’, ‘B’}}; | TRUE | / | FALSE |
| 1. The following statements are valid:   int a [3]; int b [4]; a[1] = b[2]; | TRUE | / | FALSE |
| 1. A **long int** type variable requires eight bytes of memory | TRUE | / | FALSE |
| (d) The **rand()** function is defined in **math.h** | TRUE | / | FALSE |
| (e) A string is a char array but a char array is not a string. | TRUE | / | FALSE |
| (f) This is a valid variable name in C: **\_while** | TRUE | / | FALSE |
| (g) This for loop iterate 5 times: for (int i=0; i<5; i--) { printf ( ̎ Hi ̎ ); } | TRUE | / | FALSE |
| (h) If x=5 and y=7, the following while loop is an infinite loop:  while (x != y){ printf(“Hello!\n”);} | TRUE | / | FALSE |
| (i) The following statements are valid:  char a [3]; char b [3]; a = b; | TRUE | / | FALSE |
| (j) The following statement will give a compilation error:  char alphabet [12] = “\_**SE\_185”**; | TRUE | / | FALSE |

1. **Expressions and Assignments (5 x 3p each = 15p)**

What is the output of each of the printf statements below (there are 5 printf)?

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| --- |
| #include<stdio.h>  int main(){  float result;  int num1 = 4, num2 = 16, num3 = 12;  double a = 3.0, b = 2, c = 4.0;    printf ("(a) %f\n", result = num2/num1);  printf ("(b) %0.2f\n", result = b+(num2%num1));  printf ("(c) %0.1f\n", result = (num2\*num3)/c);  printf ("(d) %0.2f\n", result = num2/(5%num1));  printf ("(e) %0.2f\n", result = ++num2+a\*num3);  return 0;  } |

*Output of printf # 1:* (a)4.000000

*Output of printf # 2:* (b)2.00

*Output of printf # 3:* (c)48.0

*Output of printf # 4:*(d)16.00

*Output of printf # 5:* (e)53.00

1. **Number Conversions (4 x 5p each = 20p)**
2. Convert 17310 to Binary

10101101

1. Convert 7A2F16 to Octal

36427

1. Convert 10010112 to Hexadecimal

95

1. Convert 1100 10012 to Decimal

201

1. **Code Snippets (20p)**
2. **Code Snippets (3-6 lines maximum) (6p**) Write a while loop to the print odd numbers from 12 to 89.

The output should be in the following format: 13, 15, 17, 19, ….…

while(number <= 89){

printf(“%d, ”, number);

number += 2;}

1. Code Snippets (3-12 lines maximum) (8p) Write a short code that ask the users to enter 4 integer numbers, and then print the even numbers entered by the users.

If the user inputs 12 13 14, 15, the output should be in the following format: 12 14

int numbers[4]; // Create an array to store the user's input

printf("Enter 4 integer numbers:\n");

for (int i = 0; i < 4; i++) {

printf("Enter number %d: ", i + 1);

scanf("%d", &numbers[i]);

if (numbers[i] % 2 == 0) { // Check if the entered number is even

printf("%d is even.\n", numbers[i]); } }

1. Code Snippets (3-6 lines maximum) (6p) Write a while loop that continuously ask the user to enter a floating-point number and print the number. [declare any variable if necessary].

while(1){

double number;

printf(“Please enter a a floating-point number: \n”);

scanf(“%lf”, &number);

printf(“%lf\n”, number);

}

1. **Rewriting Code (5 x 2p each = 10p)**
2. What is the output of the printf statements below.

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| --- |
| #include<stdio.h>  #include<string.h>  void main(){ //should be changed to “int main(void){“  char str1[50]="I am ready for SE 185 midterm 1";  int i, j, count=0; // initialize i to 0 and get rid of j -> “int I = 0, count = 0;”  while (i< strlen(str1)) {  if(str1[i] == 'a' || str1[i] == 'e' || str1[i] == 'i' || str1[i] == 'o' || str1[i] == 'u') {  count++;  }  i++;  }  printf("\nCount = %d\n" , count);  } //missing a return statement |

1. Rewrite the above C program by using for loop.

#include<stdio.h>

#include<string.h>

int main(){

char str1[50]="I am ready for SE 185 midterm 1";

int count = 0;

for (int i = 0; i < strlen(str1); i++) {

if(str1[i] == 'a' || str1[i] == 'e' || str1[i] == 'i' || str1[i] == 'o' || str1[i] == 'u') {

count++;

}

}

printf("\nCount = %d\n" , count);

return 0;

}

1. **Find program output (5p)**

What is the output of the printf statements below?

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| --- |
| #include <stdio.h>  void main () {  int userNumber [3][3] = {{10, 12, 14}, {11, 13, 15}, {16, 21, 55}};  int i, j;  for(i=0; i<3; ++i) {  for(j=0; j<3; ++j){  if ((userNumber[i][j])%3==0){  printf("%d ", userNumber[i][j]+1);  }  }    }  } |

The output is”13 16 22”

1. **Find program output (10p)**

What is the output of the printf statements below?

|  |
| --- |
| #include<stdio.h>  #include<string.h>  void main(){  char alpha [13] = "SE\_185";  char beta [13];  int i;  for(i=0; i<strlen(alpha); i++){  if (alpha[i]=='\_'){  alpha[i]='@';  continue;  }  printf("%c", alpha[i]);  }  printf("\n%s", alpha);  printf("\n%s", strncpy(beta, "Rocks\_ISU", 5));  printf("\n%s", strcat(alpha, beta));  printf("\n%.3s", alpha);  } |

*Output of printf # 1:* SE@185

*Output of printf # 2:*SE@185

*Output of printf # 3:* Rocks

*Output of printf # 4:* SE@185Rocks

*Output of printf # 5:* SE@

1. **Debugging (10p)**

Find and fix all the bugs/errors in the following C program and rewrite the code. Write a comment for each line that has bug and how to fix it.

|  |
| --- |
| #include<stdio.h>  #include<stdlip.h>    doable calculate(a) should be int and double is spelled wrong, also missing and int for a  {  int result = 42++a; should be “int result = 42 + a;”  return result;  };    void main(){ //should be “int main(void){  print("Hello World!/n'); printf is spelled as print and second quotation mark is a single instead of double quotation  double res = calculate(7); should be int  printf("res=%d" res); missing comma after quotation  missing “return 0;  } |

1. **Bonus question: Rectangle Properties (15p)**

Write a complete C program that asks the user to input the height and width of a rectangle and then call 3 individual functions to calculate: (1) area of the rectangle; (2) perimeter of the rectangle; and (3) diagonals of the rectangle. The main function must then print these values.

#include <stdio.h>

#include<math.h>

int main(){

double width;

double height;

printf("Please enter a width: \n");

scanf("%lf", &width);

printf("Please enter a height: \n");

scanf("%lf", &height);

printf("Area: %lf\n", width\*height);

printf("Perimeter: %lf\n", 2\*width+2\*height);

printf("Diagonal: %lf", sqrt((width\*width) +(height\*height)));

return 0;

}

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| --- | --- | --- |
| **Question** | **Max** | **Score** |
| 1. True/False | 10 |  |
| 1. Expressions and Assignments | 15 |  |
| 1. Number Conversions | 20 |  |
| 1. Code Snippets | 20 |  |
| 1. Rewriting Codes | 10 |  |
| 1. Find program output | 5 |  |
| 1. Find program output | 10 |  |
| 1. Debugging | 10 |  |
| 1. Rectangle Properties | 15 |  |
| TOTAL: | 115 |  |