

## Midterm Exam

PROBLEM SOLVING IN C  
(CSCE 105, SPRING 2006)

URL: <http://www.cse.unl.edu/~cstrobe/csce105s06/>

8th March, 2006

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Name :  
Course No : **CSCE105**

1. (10 points) Write a complete program that prints: (a) your name, (b) your instructors name, and (c) the date, each item on a separate line.

**Answer Box:**

2. (1 point each) Write a conditional statement that is equivalent to the English statements:

<p>a. <math>x</math> is less than <math>y</math> and <math>y</math> is less than <math>z</math></p> <p>b. <math>x</math> and <math>y</math> are greater than or equal to <math>z</math></p> <p>c. <math>x</math> is in the range <math>z</math> to <math>y</math>, inclusive</p> <p>d. <math>\text{year}</math> is divisible by 4</p> <p>e. <math>x</math> is either equal to 8 or not greater than 1</p>	
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3. (1 point each) Write the following equations in C:

$\sqrt{x^2 + y^2}$ $\frac{3xy^2}{ 2z }$ $\frac{1}{x \sin x}$ $2^{3.14-x}$ $(x + \cos y)^{0.25}$	
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4. (1 point each) What is the value assigned to *val* after performing following declarations:

```
#define PI 3.14

int x = 5, y = 3;
double z = 1.5;
double val;
```

Action Performed	Value of <i>val</i>
<i>val</i> = <i>x</i> + 2.2	
<i>val</i> = ( <i>x</i> / <i>y</i> )/ <i>z</i>	
<i>val</i> = <i>z</i> + 1/2	
<i>val</i> = <i>x</i> + <i>z</i> /2	
<i>val</i> = (int) <i>z</i> *2.	

5. (5 points) Write an **if-else** statement that compares the **double** variable **pH** with 7.0 and makes the following assignments to the **int** variables **neutral**, **base**, and **acid**:

```
0  0  1  if pH is less than 7
0  1  0  if pH is greater than 7
1  0  0  if pH is equal to 7
```

**Answer Box:**

6. (10 points) What does the following code print out?

```
int prod = 1, sum = 0;
int i = 0;

while(i <= 4) {
    sum += i;
    i += 2;
}

while(i < 5) {
    prod *= i;
    i++;
}

printf("%d\n", sum);
printf("%d\n", prod);
```

**Answer Box:**

7. (10 points) Write a complete program that:
- (a) Reads a value from the user into the variable `input_double` and prints it out, and
  - (b) Reads a value in from the data file `input.dat` into the variable `input_char`, and outputs it to the file `output.dat`.

**Answer Box:**

8. (10 points) Write a `for` loop that will produce the following output (*Note the justification of the numbers*):

```
2
4
6
8
10
```

**Answer Box:**

9. (10 points) April 15th is approaching. To commemorate this, write a function that takes the input variable `salary`, which calculates and returns the amount of taxes that a single taxpayer must pay based on their salary in 2005. The table below gives the range of the salary, as well as the corresponding tax rates. The calculation of tax rates is as follows

$$\text{Taxes} = (\text{Salary} - \text{Base}) * \text{Percent\_Excess} + \text{Base}$$

Salary Range (\$)			Base Tax (\$)	Percent Excess
0.00	–	7,300	0.00	10.0%
7,300	–	29,700	730.00	15.0%
29,700	–	71,950	4,090.00	25.0%
71,950	–	150,150	14,652.50	28.0%
150,150	–	no limit	36,548.50	35.0%

**Answer Box:**





11. (10 points)

```
int func(int number) {  
    int i, return_value;  
  
    return_value = 1;  
    for(i = 0; i < sqrt(number); i++) {  
        if(number % i == 0)  
            return_value = 0;  
    }  
    return return_value;  
}
```

In the following table, write what the return value for this function is, given the variable number:

number	Value of func(number)
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	

What does this function do?

**Answer Box:**

**12. Extra Credit:** (5 points)

Write a function with an input argument `number` that print the following output if, for example, `number = 3`:

```
0
0 1
0 1 2
0 1 2 3
0 1 2
0 1
0
0
```

*HINT: You will need to use nested `for` loops to do this.*

**Answer Box:**

Question	Points	Score
1	10	
2	5	
3	5	
4	5	
5	5	
6	10	
7	10	
8	10	
9	10	
10	20	
11	10	
<b>EC</b>	5	
Total:	100+5	