

Engineering 101, Winter '05

Homework 3

Name: KEY username: key Lab instructor: N/A

This assignment is due Feb 7th either in class or in the course "box" by noon. Late homework is not accepted.

This homework is supposed to give you some practice for the first exam. Try to take it like an exam; use it as a diagnostic to see how much you understand, and how much you need to study.

Print out this homework, write your answers below the questions, and turn the whole thing in. Assignments that are unstapled or are difficult to read will lose at least 50% of the possible points and we may not grade them at all.

This assignment is worth about 1% of your grade in the class and is graded out of 50 points. Remember you may drop one homework assignment. **Note that there are 5 pages to this assignment.**

Question 1

The function below is supposed to return the largest of its three arguments. It is broken. Show any set of input data that reveals its defect(s), and briefly describe the error that results.

```
double max3 (double x, double y, double z)
{
    double m=y;
    if (x > y)
    {
        m=x;
    }
    else if (z > y)
    {
        m=z;
    }
    if (x > z)
    {
        m=x;
    }
    return m;
}
```

$$\text{max3}(3, 8, 2) == 3$$

For this example the last if statement executes, ignoring y.

Question 2

The array $x = \{1, 2, 3, 4, 5, 6\}$ is passed into each of the following functions.

What are the values in the array, listed in order, when each function finishes?

array size assumed to be 6

```
void indefensible(double x[], int array_size)
{
    int i = 0;
    while(i < array_size/2)
    {
        x[i] = x[array_size - 1 - i];
        i = i + 1;
    }
}
```

$x[0] = x[5]$
 $x[1] = x[4]$
 $x[2] = x[3]$

6, 5, 4, 4, 5, 6

```
void inexplicable(double x[], int array_size)
{
    int i = 0;
    while (i < array_size/2)
    {
        int a = x[i];
        x[i] = x[array_size - 1 - i];
        x[array_size - 1 - i] = a;
        i = i+1;
    }
}
```

$a = x[0]$
 $x[0] = x[5]$
 $x[5] = a$
⋮

6, 5, 4, 3, 2, 1

```
void inconceivable(double x[], int array_size)
{
    int i = array_size - 1;
    while(i > 1)
    {
        x[i] = x[i-1];
        i = i - 2;
    }
}
```

$i = 5$
 $x[5] = x[4]$
 $i = 3$
 $x[3] = x[2]$
 $i = 1$

1, 2, 3, 3, 5, 5

Question 3

I have an electric circuit consisting of a number, N , of resistors hooked up in parallel. The resistance of the i^{th} resistor is R_i . The resistance of the complete circuit can be computed from:

$$R = \frac{1}{1/R_0 + 1/R_1 + 1/R_2 + \dots + 1/R_{N-1}}$$

Complete the function `Rtotal` that takes an array of resistance values, `Rs`, and the size of the array, `size`, as input and which returns the total resistance of the circuit that results from hooking them up in parallel.

```
double Rtotal(double Rs[], int size)
{
```

```
    int i
    double sum = 0
    for(i=0; i < size; i++)
        sum = 1/R
        sum += 1/R[i];
    return (1/sum);
```

```
}
```

Question 4

Consider the following struct definition and main function:

```
struct Time
{
    int hours;
    int minutes;
    int seconds;
}

main()
{
    Time now = {3, 45, 26};
    int secs = convert_to_seconds(now);
    cout << "the current time in seconds is: " << secs << endl;
}
```

Write the function called `convert_to_seconds` which takes a variable called `now` of type `Time` and returns that value converted to seconds.

```
int convert_to_sec (Time X)
{
    return (X.hours * 60 * 60 + X.minutes * 60 + X.seconds);
}
```

Question 5

- a. What does the Unix command `cd ..` do?

Change directory to level one up
(parent directory)

- b. If I want to print my `inlab4.txt` with margins and in the room `b507 pierpont`, what is the command? (Make sure your syntax is right.)

~~enscript -d b507~~
`enscript inlab4.txt -Pb507 pierpont`

- c. Let's say my file `project4.cc` is inside my home directory. My `eng101` directory is inside my home directory, and my `P4` directory is inside my `eng101` directory. Right now, I'm inside my home directory. How do I make a copy of the file `project4.cc` and put it inside my `P4` directory with one command?

`cp project4.cc eng101/P4`

- d. What does this line of code do: `if(!score && !drop) if score and drop are int's?`

The "if" body will be executed if `(score == 0)` and `(drop == 0)`

- e. How much do you like C++?

I prefer C myself.

U"