Homework 2: Midterm 1 Preparation

Due: Monday, January 24, in-class

Problem 1. Identifiers

In the list below, circle all C identifiers (i.e., valid variable names). (note, some variable names are valid, but prohibited by our style guide. They should be circled.)

- \texttt{b\_o\_o}
- \texttt{stop\.it}
- \texttt{"none"}
- \texttt{12Months}
- \texttt{\_X_}
- \texttt{Flash\_Drive}
- \texttt{n00b}
- \texttt{INWARDS}
- \texttt{HOW\_MUCH?}
- \texttt{if20}
- \texttt{true}
- \texttt{if}
- \texttt{iff}
- \texttt{good!}
- \texttt{float}
- \texttt{me\_gmail}
- \texttt{don't\_like\_it}
- \texttt{my1\_000}
- \texttt{__Robots}
- \texttt{stone-cold}

Problem 2. Constants

For each constant below, specify its type. If the constant is invalid, say \texttt{"invalid"}.

(a) -57
(b) 929,567
(c) -2.001
(d) 'c'
(e) 800e-3
(f) 4.2.2
(g) 0
(h) 'Alex'
(i) true
(j) 23,01.14
(k) 5.2e12
(l) '\n'
(m) 3.4z3
(n) "a"
(c) 4.2e2.4
Problem 3. Expressions

Rewrite each C expression using parentheses to show the order of operations.
(e.g. a+b-c is (a+b)-c.)

(a) $7 + x + 4 / y$

(b) $a + - 13 - - x * 2$

(c) $c * f - 2 == 3 + 2$

(d) $a == 4 && b == 3 * -34$

(e) $a + b - - c == -c - -b$

Problem 4. Assignment

Consider the following code fragment:

```c
int x, y, z;
...
x = x + z;
y = x + y;
z = z + y;
```

For each set of variable assignments below, specify the values of x, y and z after the code fragment executes.

(a) Initial: x: 5   y: 6   z: 7
    Final: x: ___  y: ___  z: ___

(b) Initial: x: 0   y: 100  z: -50
    Final: x: ___  y: ___  z: ___

(c) Initial: x: 16  y: 32   z: 64
    Final: x: ___  y: ___  z: ___
Consider the following code fragment:

```c
int x, y, z;
...
x = x + z/y;
y = y * x % z;
z = z + 1;
```

For each set of variable assignments below, specify the values of $x$, $y$ and $z$ after the code fragment executes.

(a) Initial: $x$: 4 $y$: 4 $z$: 4

Final: $x$: ___ $y$: ___ $z$: ___

(b) Initial: $x$: 2 $y$: 3 $z$: 8

Final: $x$: ___ $y$: ___ $z$: ___

(c) Initial: $x$: 16 $y$: 10 $z$: 4

Final: $x$: ___ $y$: ___ $z$: ___

Problem 6. Comparisons and logical expressions

Consider the following assignments (all variables are `int` and declared):

```c
x = 4;
y = x-1;
z = (x-1)*(y-1);
```

For each expression below, specify what it evaluates to.

(a) $x \geq y$ evaluates to __________
(b) $y + x == z$ evaluates to __________
(c) $y + x > z$ evaluates to __________
(d) $(x > y) \&\& (z > x)$ evaluates to __________
(e) $(x >= y) \&\& (y+x == z)$ evaluates to __________
(f) $(x >= y) || (y+x == z)$ evaluates to __________
(g) !(x>y) evaluates to __________
(h) !( (x >= y) && (y+x == z) ) evaluates to __________
(i) !(x >= y) || !(y+x == z) evaluates to __________
(j) $(x == 1) || (x == 3) || !(x == 4)$ evaluates to __________
(k) !( !(x == y) ) evaluates to __________

Write a program that declares two integer variables, reads the value of each of them from the keyboard and outputs the average of the two.

```c
#include <stdio.h>

int main() {
    return 0;
}
```

Problem 8. More code writing.

Write a program that declares an integer variable, reads its value from the keyboard, computes its cube and outputs it to screen.

```c
#include <stdio.h>

int main() {
    return 0;
}
```

Three students wrote three different programs below to compute the product of two numbers entered from the keyboard. None of the three programs work as desired. Briefly explain why for each program.

Program 1  #include <stdio.h>

```c
int main() {
    int y;
    scanf("%d", &x);
    scanf("%d", &y);
    y = y * x;
    printf("%d\n", y);
    return 0;
}
```

Program 2  #include <stdio.h>

```c
int main() {
    int x,y;
    scanf("%d", &x);
    scanf("%d", &y);
    x = y * x;
    printf("%d\n", y);
    return 0;
}
```

Program 3  #include <stdio.h>

```c
int main() {
    int x,y;
    scanf("%d", &x);
    y = y * x;
    scanf("%d", &y);
    printf("%d\n", x);
    return 0;
}
```