Homework 1: Midterm 1 preparation

Due: Monday, January 23, 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.)

```
a1              ThisIsAnInt       Myspace.com         12Months        _X_

Flash_Drive     Num_Vars          INWARDS             HOW_MUCH?       if20

true            if                iff                 a1a2a3a4        float

me@gmail    don't_like_it     not_my_fav_o_rit_e    __Robots        stone-cold
```

Problem 2. Constants

For each constant below, specify its type. If the constant is invalid, say `"invalid"`.

```
(a) -357 ________     (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) `4 + x + 3 / x` _____

(b) `b + - 23 - -14 * 2` _____

(c) `c * f - 2 % 3 + 2` _____

(d) `3 * -34 - -23 + 45 / 23` _____

(e) `a + b % - c / a * b / c` _____

Problem 4. Assignment

Consider the following code fragment:

```
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: 3 y: 1 z: 1

Final: x: ___ y: ___ z: ___

(b) Initial: x: 7 y: 12 z: 10

Final: x: ___ y: ___ z: ___

(c) Initial: x: -1 y: 15 z: 22

Final: x: ___ y: ___ z: ___

Problem 5. Trickier assignment

Consider the following code fragment:

```
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: 5      y: 5     z: 5

    Final:     x: ___    y: ___   z: ___

(b) Initial:   x: 3      y: 2     z: 5

    Final:     x: ___    y: ___   z: ___

(c) Initial:   x: 10    y: 10      z: 20

    Final:     x: ___    y: ___    z: ___
```

Problem 7. Code writing.

Write a function that takes as input two integer values, computes the square root of the sum of their squares and returns it.

Problem 8. More code writing.

Three towns, Sunny Hill, Greenville and Riverbend are represented as points on a map. Sunny Hill is located at the coordinates $(20, 14)$, Greenville — at the the coordinates $(32, -12)$ and Riverbend is at the origin of the coordinates, $(0, 0)$. Write a C program that uses **only** the function you defined in Problem 7 to compute the distances between each pair of towns, and print them out. (Make certain your program is **complete**). You can assume that the function from Problem 7 is defined in a separate file.

```
#include <stdio.h>



int main() {









   return 0;
```

```
}
```

Problem 9: Function composition.

Consider the following C functions:

```
int p(int a, int b) {

  return (a+b)/a;
}

int r(int a) {

  return a-1;
}

int s(int a, int b) {

  return (a*a + b*b)/(a*b);
}
```

Compute the result of the following function calls:

(a) `p(r(10), r(-2))` _____

(b) `r(s(2,3))` _____

(c) `s(p(1,r(3)), p(4, -4))` _____

(d) `s(r(s(1,1)), r(s(r(4),r(-1))))` _____

(e) `r(r(r(5)))` _____

(f) `p(p(1,1), p(2,2))` _____

(g) `s(s(1,1), s(2,2))` _____

(h) `s(p(1,1), p(2,2))` _____

(i) `s(r(s(-1,1)), r(s(-2,2)))` _____

(j) `p(s(r(4),p(1,2)), s(r(-1), p(3,4)))` _____