YOUR NAME: _____

RCS ID: _____

Your RCS ID is the first part of your RPI e-mail address

Principles of Software Quiz 2

Sept. 20, 2018

10 points total

Question 1. (2pts) There may exist two different weakest preconditions $P1$ and $P2$ for a given segment of Java code. (By "different" we mean that $P1$ and $P2$ are not just two different ways for writing exactly the same logical formula.)

(a) true

(b) false

Question 2. (8pts) Consider the loop in `mul()`. `mul()` requires `a>0 && b >0` and returns $a \times b$. For example, `mul(5, 3) = 15`.

```
int mul(int a, int b) {
   int x = 0;
   int p = 0;
   while (p < b) {
         x = x + a;
         p = p + 1;;
   }
   return x;
}
```

(a) Given the decrementing function D: $b - p$, show that D=0 implies the loop exit condition. (2 points)

(b) Given the loop invariant $x = p \times a$ `&&` $p \leq b$, show that the loop invariant is true for the base case before the loop executes. (3 points)

(c) Show that it holds for the general case. That is, assume it holds for iteration k and show that it holds for iteration k+1. (3 points)