Assignment 2
Programming Theory

This assignment is worth 2 point in the final exam, and the deadline is 4th of December, 2008.

**Assignment 1 (25%)** Prove the following

\[ a \geq 0 \land b \geq 0 \Rightarrow wp(\{z, x, y := 0, a, b\}, x \geq 0 \land z + x \times y = a \times b) \]

**Assignment 2 (25%)** Calculate and simplify \(wp(P,R)\).

\[ P : \quad x, y := a, b; \]
\[ \quad \text{if } x > y \rightarrow x := x - y \]
\[ \quad \text{fi} \]
\[ \quad \text{fi} \]
\[ R : \quad \{x > 0 \land y > 0 \land \gcd(x,y) = \gcd(a,b)\} \]

You may use the following properies of \(\gcd\)

1. \(\gcd(x,y) = \gcd(x-y,y)\)
2. \(\gcd(x,y) = \gcd(x,y-x)\)

**Assignment 3 (50%)** Using the alternative command theorem, show that the following program is correct.

\[ \{ (x = y + 5) \lor (y = x + 6) \} \]
\[ \text{if } y < x \rightarrow x, y := x - 4, y + 7 \]
\[ \text{fi} \]
\[ \text{fi} \]
\[ \{ (x = y + 5) \lor (y = x + 6) \} \]