Concepts of programming languages

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Example

`fib`: calculates (n+1)-th and (n+2)-th Fibonacci number.

```
procedure fib
    if n = 0 then
        x1 += 1     ; -- 1st Fib nr is 1.
        x2 += 1     ; -- 2nd Fib nr is 1.
    else
        n -= 1
        call fib
        x1 += x2
        x1 <=> x2
    fi x1 = x2
```

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        call fib
        x1 += x2
        x1 <=> x2
    fi x1 = x2      ; -- Used for inverting the if-statement.
```

Q: How do we calculate the inverse?

$\mathcal{I}[\![\texttt{if } e_1 \texttt{ then } s_1 \texttt{ else } s_2 \texttt{ fi } e_2]\!] = \texttt{if } e_2 \texttt{ then } \mathcal{I}[\![s_1]\!] \texttt{ else } \mathcal{I}[\![s_2]\!] \texttt{ fi } e_1$

Example

`fib`: calculates (n+1)-th and (n+2)-th Fibonacci number.

```
procedure fibInverse
    if x1 = x2 then
        x2 -= 1          ; -- 2nd Fib nr is 1.
        x1 -= 1          ; -- 1st Fib nr is 1.
    else
        x1 <=> x2
        x1 -= x2
        call fibInverse
        n += 1
    fi n = 0
```

Example

`fib`: calculates (n+1)-th and (n+2)-th Fibonacci number.

- Q: What does the inverse of fib do?

```
procedure fibInverse
    if x1 = x2 then
        x2 -= 1          ; -- 2nd Fib nr is 1.
        x1 -= 1          ; -- 1st Fib nr is 1.
    else
        x1 <=> x2
        x1 -= x2
        call fibInverse
        n += 1
    fi n = 0
```