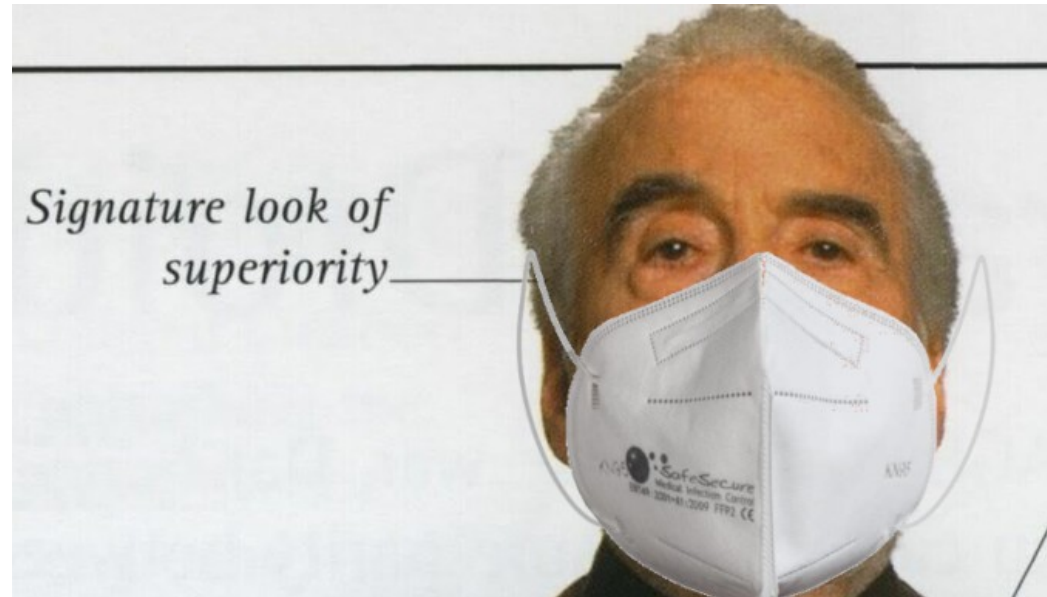


FPV Week 1: Implications, Assertions and Conditions



Grade Bonus

- Successful participation ($\geq 70\%$) in quizzes and programming tasks will lead to a ~~bonus~~ of 0.3 in the final exam, provided that you passed the exam.
- Programming homework and quizzes are to be submitted individually.
- Discussing solutions before the end of the week is considered plagiarism.
- Plagiarism will not be tolerated and will (at the very least) lead to exclusion from the bonus system

Material

The screenshot shows a GitHub repository page for the repository `Funky-Punky/FPV_SoSe22_T8_Di-15-17`. The repository is public and has a dark theme. The main content area displays the `README.md` file, which contains the title `FPV_SoSe22_T8_Di-15-17` and a description: "Materialien für Jonas' Tutorium in FVP SoSe22." It also includes a Zulip stream link: `https://zulip.in.tum.de/#narrow/stream/1030-FPV_T_8`. The right sidebar shows the repository's statistics: 0 stars, 1 watching, and 0 forks. The bottom of the page features a footer with the GitHub logo, copyright information, and various links.

Funky-Punky / `FPV_SoSe22_T8_Di-15-17` Public

[Code](#) [Issues](#) [Pull requests](#) [Actions](#) [Projects](#) [Wiki](#) [Security](#) [Insights](#) [Settings](#)

[main](#) [1 branch](#) [0 tags](#) [Go to file](#) [Add file](#) [Code](#) [About](#)

Funky-Punky Update `README.md` 7a9065a 9 hours ago 2 commits

File	Commit	Time
<code>.gitignore</code>	Initial commit	9 hours ago
<code>README.md</code>	Update <code>README.md</code>	9 hours ago

README.md

FPV_SoSe22_T8_Di-15-17

Materialien für Jonas' Tutorium in FVP SoSe22.

Zulip-Stream: https://zulip.in.tum.de/#narrow/stream/1030-FPV_T_8

Releases

No releases published
[Create a new release](#)

Packages

No packages published
[Publish your first package](#)

© 2022 GitHub, Inc. [Terms](#) [Privacy](#) [Security](#) [Status](#) [Docs](#) [Contact GitHub](#) [Pricing](#) [API](#) [Training](#) [Blog](#) [About](#)

https://github.com/Funky-Punky/FPV_SoSe22_T8_Di-15-17

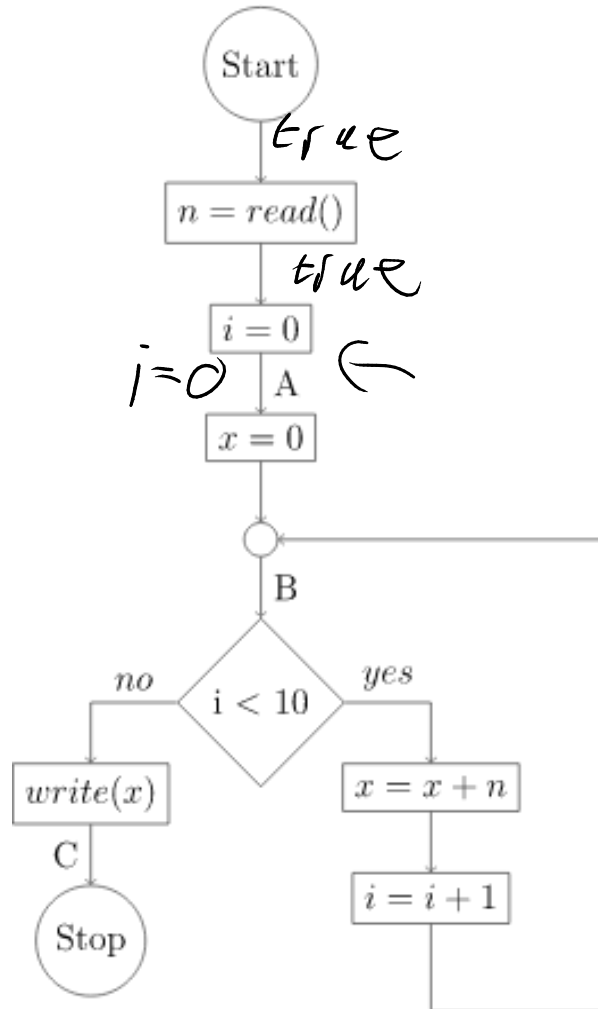
Week 01 Tutorial 01 Recap: Implications

1. $x = 1 \implies 0 < x$ ✓
2. $x < 6 \implies x = 3$ ✗
3. $x > 0 \implies x \geq 0$ ✓
4. $x = -2 \implies x < -1 \vee x > 1$ ✓
5. $x = 0 \vee x = 7 \implies 4 \neq x$ ✓
6. $x = 1 \implies x \leq 3 \wedge y > 0$ ✗
7. $x < 8 \wedge y = x \implies y \neq 12$ ✓
8. $x = 1 \vee y = 1 \implies x > 0$ ✗ $x = -1 \quad y > 7$
9. $x \neq 5 \implies \text{false}$ ✗
10. $\text{true} \implies x \neq y$ ✗
11. $\text{false} \implies x = 1$ ✓
12. $x \geq 1 \implies 2x + 3 = 5$ ✓
13. $A \wedge (x = y) \implies A$ ✓
14. $B \implies A \vee B$ ✓
15. $A \implies (B \implies A)$ ✓
16. $(A \implies B) \implies A$ ✗

A B		$A \rightarrow B$
0	0	1
0	1	1
1	0	0
1	1	1

$A \rightarrow B \equiv \bar{A} \vee B$

Week 01 Tutorial 02 Assertions

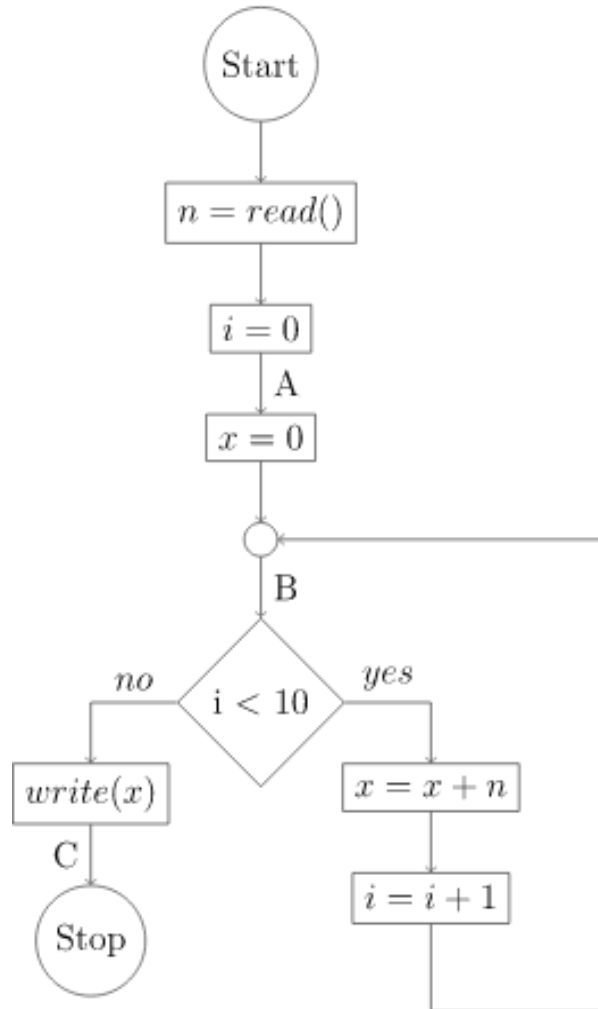


1. Which of the following assertions hold at point **A**?

- a) $i \geq 0$ ✓
- b) $x = 0$ ✗
- c) $i \leq 10 \wedge x \neq 0$ ✗
- d) *true* ✓
- e) $i = 0$ ✓
- f) $x = i$ ✗

true
 \cap
 $i \geq 0$
 \cap
 $i = 0$

Week 01 Tutorial 02 Assertions

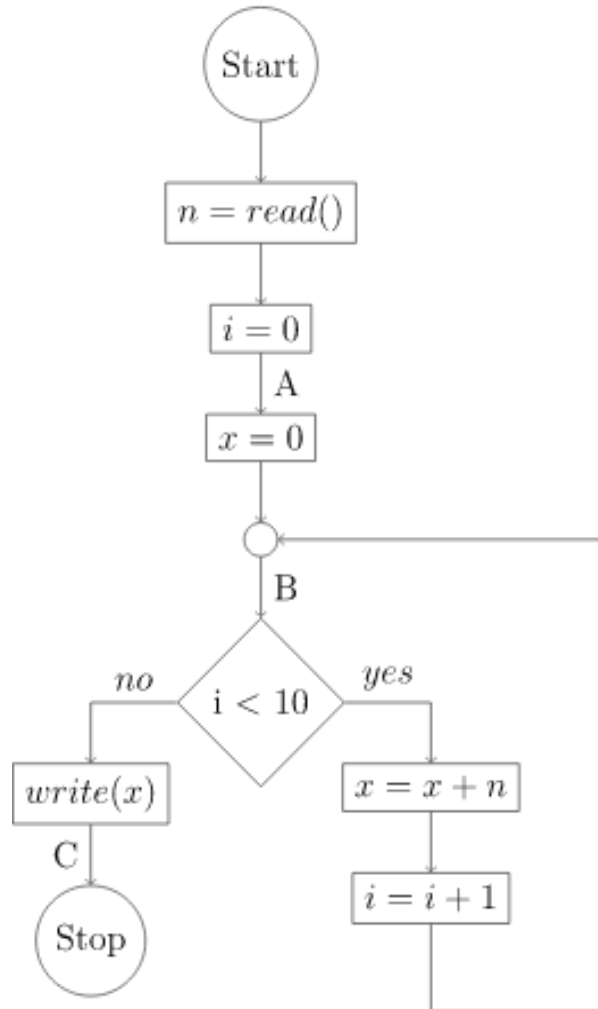


2. Which of the following assertions hold at point *B*?

- a) $x = 0 \wedge i = 0$ ✗
- b) $x = i$ ✗
- ↙ ○ c) $i < x$ ✗
- d) $0 \leq i \leq 10$ ✓
- e) $i \geq 0 \wedge x \geq 0$ ✗
- ↙ ○ f) $n = 1 \implies x = i$ ✓

$$x = i \cdot n \\ \wedge 0 \leq i \leq 10$$

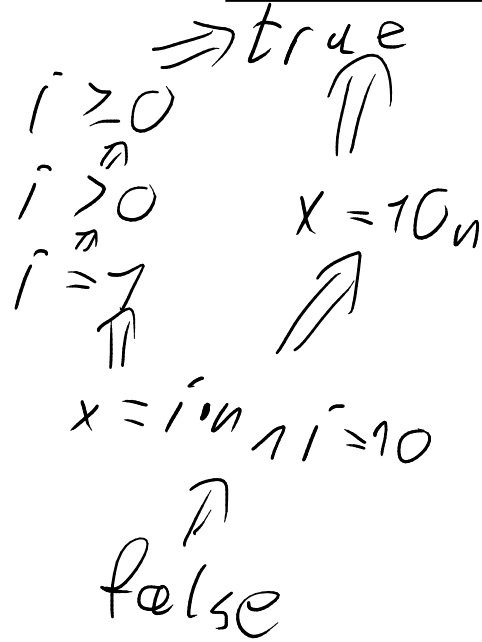
Week 01 Tutorial 02 Assertions



3. Which of the following assertions hold at point *C*?

- a) $i \geq 0$ ✓
- b) $i = 10$ ✓
- c) $i > 0$ ✓
- d) $x \neq n$ ✗
- e) $x = 10n$ ✓
- f) $x = i * n \wedge i = 10$ ✓

Week 01 Tutorial 03 The Strong and the Weak



3. Which of the following assertions hold at point C ?

- a) $i \geq 0$
- b) $i = 10$
- c) $i > 0$
- ~~$i = 7$~~
- e) $x = 10n$
- f) $x = i * n \wedge i = 10$

1. When annotating the control flow graph, can you say that one of the given assertions is "better" than the others?

2. Can you arrange the given assertions in a meaningful order?

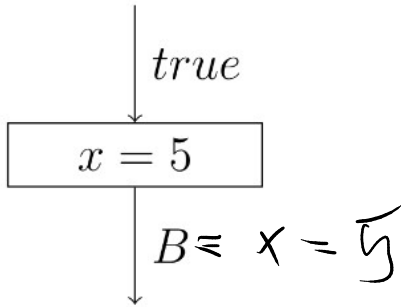
3. How can you define a *stronger than* relation formally?

4. How do **true** and **false** fit in and what is their meaning as an assertion?

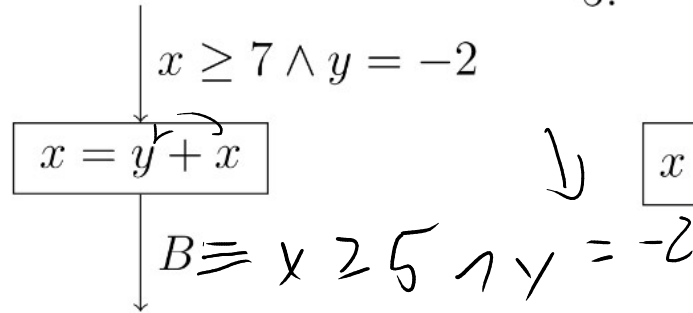
5. What are the strongest assertions that still hold at A , B and C ?

Week 01 Tutorial 04 Strongest Postconditions

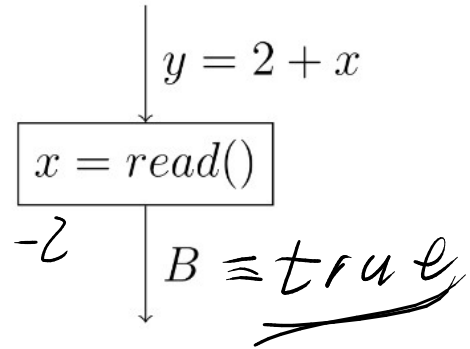
1.



3.

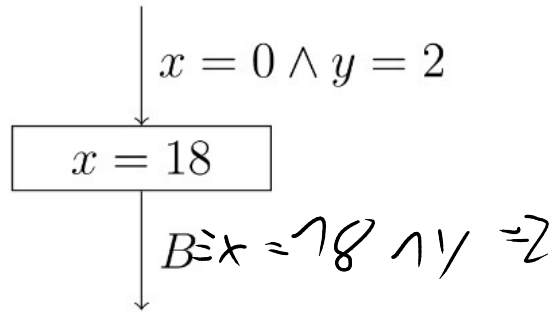


5.

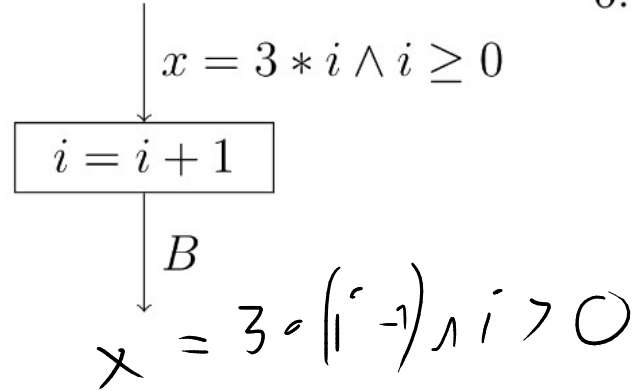


Week 01 Tutorial 04 Strongest Postconditions

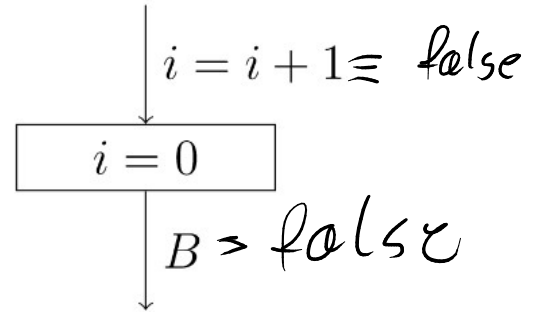
2.



4.

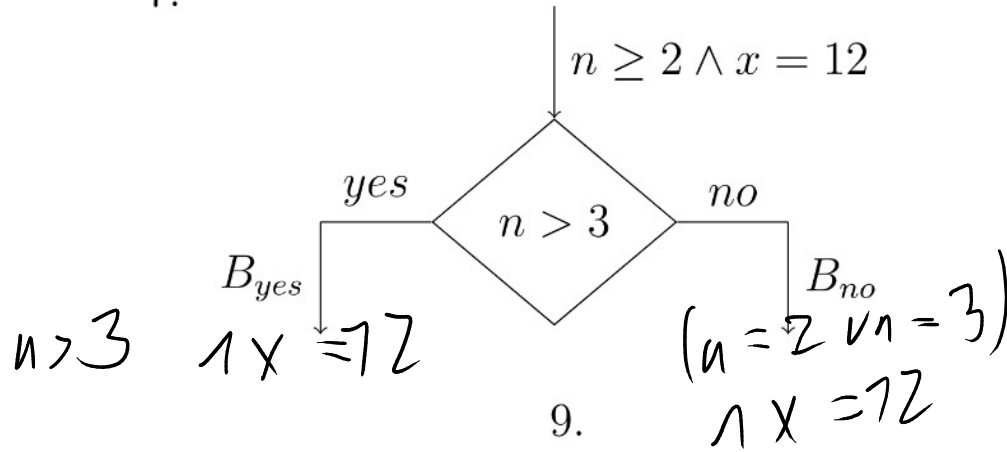


6.



Week 01 Tutorial 04 Strongest Postconditions

7.



8.

