

input A, B, C

Print in nondecreasing order

{true}

if $(A > B)$

then $temp \leftarrow A$

$A \leftarrow B$

$B \leftarrow temp$

if $(B \leq C)$

then print A, B, C

else

if $(A \leq C)$

then print A, C, B

else print C, A, B

There is no one postcondition here. We just want to know that at each point where the algorithm produces output, the values are printed in nondecreasing order.

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Print in nondecreasing order

{true}

if $(A > B)$

then $temp \leftarrow A$

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$B \leftarrow temp$

{ $A \leq B$ *}*

Here we want A and B ordered

if $(B \leq C)$

then *print* A, B, C

else

if $(A \leq C)$

then *print* A, C, B

else *print* C, A, B

input A, B, C

{true}

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if $(B \leq C)$

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Print in nondecreasing order

$\neg(A > B) \Rightarrow (A \leq B)$ (*test false*)

Here we want A and B ordered

input A, B, C

$\{true\}$

if $(A > B)$

$\{B \leq A\}$

then $temp \leftarrow A$

$A \leftarrow B$

$B \leftarrow temp$

$\{A \leq B\}$

if $(B \leq C)$

then *print* A, B, C

else

if $(A \leq C)$

then *print* A, C, B

else *print* C, A, B

Print in nondecreasing order

$\neg(A > B) \Rightarrow (A \leq B)$ (*test false*)

(*test true*) $\Rightarrow \{B \leq A\}$

$\{B \leq temp\}$

$\{A \leq temp\}$

$\{A \leq B\}$

So we have A and B ordered

input A, B, C

$\{true\}$

if $(A > B)$

$\{B \leq A\}$

then $temp \leftarrow A$

$A \leftarrow B$

$B \leftarrow temp$

$\{A \leq B\}$

if $(B \leq C)$

$\{A \leq B\} \wedge \{B \leq C\} (test\ true)$

then print A, B, C

else

if $(A \leq C)$

then print A, C, B

else print C, A, B

Print in nondecreasing order

$\neg(A > B) \Rightarrow (A \leq B)$ (*test false*)

$(test\ true) \Rightarrow \{B \leq A\}$

$\{B \leq temp\}$

$\{A \leq temp\}$

$\{A \leq B\}$

So we have A and B ordered

$\Rightarrow \{A \leq B \leq C\}$

input A, B, C

$\{true\}$

if $(A > B)$

$\{B \leq A\}$

then $temp \leftarrow A$

$A \leftarrow B$

$B \leftarrow temp$

$\{A \leq B\}$

if $(B \leq C)$

$\{A \leq B\} \wedge \{B \leq C\} (test\ true)$

then print A, B, C

$\{A \leq B\} \wedge \{B > C\} (test\ false)$

else

if $(A \leq C)$

then print A, C, B

else print C, A, B

Print in nondecreasing order

$\neg(A > B) \Rightarrow (A \leq B)$ (*test false*)

$(test\ true) \Rightarrow \{B \leq A\}$

$\{B \leq temp\}$

$\{A \leq temp\}$

$\{A \leq B\}$

So we have A and B ordered

$\Rightarrow \{A \leq B \leq C\}$

$\Rightarrow \{A \leq B\} \wedge \{C \leq B\}$

input A, B, C

$\{true\}$

if $(A > B)$

$\{B \leq A\}$

then $temp \leftarrow A$

$A \leftarrow B$

$B \leftarrow temp$

$\{A \leq B\}$

if $(B \leq C)$

$\{A \leq B\} \wedge \{B \leq C\}$ (*test true*)

then print A, B, C

$\{A \leq B\} \wedge \{B > C\}$ (*test false*)

else

if $(A \leq C)$

$\{A \leq B\} \wedge \{C \leq B\} \wedge \{(A \leq C)\}$ (*test true*)

then print A, C, B

else print C, A, B

Print in nondecreasing order

$\neg(A > B) \Rightarrow (A \leq B)$ (*test false*)

(*test true*) $\Rightarrow \{B \leq A\}$

$\{B \leq temp\}$

$\{A \leq temp\}$

$\{A \leq B\}$

So we have A and B ordered

$\Rightarrow \{A \leq B \leq C\}$

$\Rightarrow \underline{\{A \leq B\} \wedge \{C \leq B\}}$

$\Rightarrow \{A \leq C \leq B\}$

input A, B, C

$\{true\}$

if $(A > B)$

$\{B \leq A\}$

then $temp \leftarrow A$

$A \leftarrow B$

$B \leftarrow temp$

$\{A \leq B\}$

if $(B \leq C)$

$\{A \leq B\} \wedge \{B \leq C\}$ (test true)

then print A, B, C

$\{A \leq B\} \wedge \{B > C\}$ (test false)

else

if $(A \leq C)$

$\{A \leq B\} \wedge \{C \leq B\} \wedge \{(A \leq C)\}$ (test true)

then print A, C, B

$\{A \leq B\} \wedge \{C \leq B\} \wedge \{(A > C)\}$ (test false)

else print C, A, B

Print in nondecreasing order

$\neg(A > B) \Rightarrow (A \leq B)$ (test false)

(test true) $\Rightarrow \{B \leq A\}$

$\{B \leq temp\}$

$\{A \leq temp\}$

$\{A \leq B\}$

So we have A and B ordered

$\Rightarrow \{A \leq B \leq C\}$

$\Rightarrow \underline{\{A \leq B\} \wedge \{C \leq B\}}$

$\Rightarrow \{A \leq C \leq B\}$

$\Rightarrow \{C \leq A \leq B\}$