$\{P\} \equiv \{ n \geq 0 \}$

$\{P'\} \equiv \{ 2 = 2 \}$

$\{P''\} \equiv \{ 2 = 2^{n-n+1} \}$

```
p = n
```

$\{R1\} \equiv \{ 2 = 2^{n-p+1} \}$

$\{R1'\} \equiv \{ 2 = 2^{n-p+1} \wedge True \}$

$\{R1''\} \equiv \{ 2 = 2^{n-p+1} \wedge (p \neq 0 \vee True) \}$

$\{R1'''\} \equiv \{ 1+1 = 2^{n-p+1} \wedge (p \neq 0 \vee 1 = 1) \}$

```
b = 1
```

$\{R2\} \equiv \{ b+1 = 2^{n-p+1} \wedge (p \neq 0 \vee b = 1) \}$

```
r = 1
```

$\{INV\} \equiv \{ b+r = 2^{n-p+1} \wedge (p \neq 0 \vee b = r) \}$

```
while p != 0:
```

$\{INV \wedge B\} \equiv \{ b+r = 2^{n-p+1} \wedge p \neq 0 \}$

```
    if b == 0:
```

$\{INV \wedge B \wedge C\} \equiv \{I1\} \equiv \{ b+r = 2^{n-p+1} \wedge p \neq 0 \wedge b = 0 \}$

$\{I1'\} \equiv \{ r = 2^{n-p+1} \wedge p \neq 0 \wedge b = 0 \}$

$\{I1''\} \equiv \{ r = 2^{n-p-1} \wedge p-1 \neq 0 \}$

$\{I1'''\} \equiv \{ 2r = 2^{n-p} \wedge p-1 \neq 0 \}$

```
        p = p-1
```

$\{S1\} \equiv \{ r+r = 2^{n-p+1} \wedge p \neq 0 \}$

```
        b = r
```

$\{INV'\} \equiv \{ b+r = 2^{n-p+1} \wedge p \neq 0 \}$

```
    else:
```

$\{INV \wedge B \wedge \neg C\} \equiv \{I2\} \equiv \{ b+r = 2^{n-p+1} \wedge p \neq 0 \wedge b \neq 0\}$

$\{I2'\} \equiv \{ b+r = 2^{n-p+1} \wedge p \neq 0\}$

$\{I2''\} \equiv \{ b-1+r+1 = 2^{n-p+1} \wedge p \neq 0 \}$

```
        r = r+1
```

$\{S2\} \equiv \{ b-1+r = 2^{n-p+1} \wedge p \neq 0 \}$

```
        b = b-1
```

$\{INV'\} \equiv \{ b+r = 2^{n-p+1} \wedge p \neq 0 \}$

$\{INV'\} \equiv \{ b+r = 2^{n-p+1} \wedge p \neq 0 \}$

$\{INV\} \equiv \{ b+r = 2^{n-p+1} \wedge (p \neq 0 \vee b = r) \}$

$\{INV \wedge \neg B\} \equiv \{ b+r = 2^{n-p+1} \wedge (p \neq 0 \vee b = r) \wedge p = 0 \}$

$\{Q''\} \equiv \{ b+r = 2^{n-p+1} \wedge b = r \wedge p = 0 \}$

$\{Q'\} \equiv \{ 2r = 2^{n+1} \}$

$\{Q\} \equiv \{ r = 2^{n} \}$

```
return r
```

{P} => {P'} *Kosequenzregel*
{P'} ≡ {P''}
{P''} => {R1} *Zuweisungsaxiom*
{R1} ≡ {R1'} ≡ {R1''} ≡ {R1'''}
{R1'''} => {R2} *Zuweisungsaxiom*
{R2} => {INV} *Zuweisungsaxiom*

{INV ∧ B ∧ C} ≡ {I1} ≡ {I1'}
{I1'} => {I1''} *Kosequenzregel*
{I1''} ≡ {I1'''}
{I1'''} => {S1} *Zuweisungsaxiom*
{S1} => {INV'} *Zuweisungsaxiom*

{INV ∧ B ∧ ¬C} ≡ {I2}
{I2} => {I2'} *Kosequenzregel*
{I2'} ≡ {I2''}
{I2''} => {S2} *Zuweisungsaxiom*
{S2} => {INV'} *Zuweisungsaxiom*

Bedingungsregel:
{INV ∧ B}/{INV ∧ B} => {INV'}

{INV'} => {INV} *Kosequenzregel*

While-Regel:
{INV} => {INV ∧ ¬B}

{INV ∧ ¬B} ≡ {Q''}
{Q''} => {Q'} *Kosequenzregel*
{Q'} ≡ {Q}

Sequenzregeln:
{P} => {Q}