EXAMPLE: REASONING ABOUT CODE

Starting with the postcondition and statements, fill in the intermediate assertions and weakest precondition for each of the following code fragments.

1. Assignment Statements

```
w=2*w;
z=-w;
y=v+1;
x=min(y, z);
{x<0}
```

2. If-Then-Else Statements

```
if (x!=0)
  {z=x;}
else
  {z=x+1;}
{z>0}
```

EXAMPLE: REASONING ABOUT CODE—SOLUTION

1. Assignment Statements

```
{v<-1 ∨ w>0}
w=2*w;
{v<-1 ∨ w>0}
z=-w;
{v<-1 ∨ z<0}
y=v+1;
{y<0 ∨ z<0}
x=min(y, z);
{x<0}
```

EXAMPLE: REASONING ABOUT CODE—SOLUTION

2. If-Then-Else Statements

```
if (x!=0)
   {z=x;}
else
   {z=x+1;}
{z>0}
```

Precondition

= wp("if (x!=0) {z=x;} else {z=x+1;}", z>0)

= (x≠0 ∧ wp({z=x}, z>0))) ∨ (x==0 ∧ wp({z=x+1}, z>0))

= (x≠0 ∧ x>0) ∨ (x==0 ∧ x+1>0)

= (x>0) ∨ (x==0)

= (x≥0)