

Annotate the following code and prove partial and total correctness:

$\{ (x \geq 0) \}$

`y = 1 ;`

`z = 0 ;`

`while (z != x) {`

`z = z + 1 ;`

`y = y * z ;`

`}`

$\{ (y = x!) \}$

Annotate the following code and prove partial and total correctness:

$\Downarrow ((n \geq 0) \wedge (a \geq 0)) \Downarrow$

`s = 1 ;`

`i = 0 ;`

`while (i < n) {`

`s = s * a ;`

`i = i + 1 ;`

`}`

$\Downarrow (s = a^n) \Downarrow$