

Homework 4

CS 541
Fall 1991
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In problems 1–4 (from chapter 2 of Alagić and Arbib), prove the program specification.

1 (problem 2)

```
{a = a0 ∧ b = b0}  
begin  
  t := a; a := b; b := t  
end  
{b = a0 ∧ a = b0}
```

2 (problem 5)

```
{a ≥ 0 ∧ b ≥ 0}  
if a > b then a := a - b  
  else b := b - a  
{a ≥ 0 ∧ b ≥ 0}
```

3 (problem 9)

```
{true}  
while not odd(n) do n := n div 2  
{odd(n)}
```

4 (problem 10)

```
{s = c + t ∧ t ≤ y}  
while t <> y do  
  begin  
    s := s + 1; t := t + 1  
  end  
{s = c + y}
```

5 (problem 7) Design and prove a program specification $\{P\}S\{Q\}$ in which S interchanges the values of the variables x , y and z in such a way that after this interchange the variable x has the largest value and the variable z has the smallest value.