Exercise 1

Exercise 1

Write a function `swap` that swaps the values of two `int`-variables.

Example:

```
int a = 5;
int b = 6;
// here comes your function call
std::cout << a << "\n"; // outputs 6
std::cout << b << "\n"; // outputs 5
```

Exercise 1

Solution:

```cpp
// POST: the values of i and j are swapped
void swap (int& i, int& j) {
  const int h = i;
  i = j;
  j = h;
}
```

```cpp
int a = 5;
int b = 6;
swap(a, b);
std::cout << a << "\n"; // outputs 6
std::cout << b << "\n"; // outputs 5
```

Exercise 1

Solution:

```cpp
// POST: the values of i and j are swapped
void swap (int& i, int& j) {
  const int h = i;
  i = j;
  j = h;
}
```

```cpp
int a = 5;
int b = 6;
swap(a, b);
std::cout << a << "\n"; // outputs 6
std::cout << b << "\n"; // outputs 5
```

a: 5

Exercise 1

Solution:

```cpp
// POST: the values of i and j are swapped
void swap (int& i, int& j) {
  const int h = i;
  i = j;
  j = h;
}
```

```cpp
int a = 5;
int b = 6;
swap(a, b);
std::cout << a << "\n"; // outputs 6
std::cout << b << "\n"; // outputs 5
```

```
a:  5
b:  6
```

Exercise 1

Solution:

```
// POST: the values of i and j are swapped
void swap (int& i, int& j) {
  const int h = i;
  i = j;
  j = h;
}
```

```
int a = 5;
int b = 6;
swap(a, b);
std::cout << a << "\n"; // outputs 6
std::cout << b << "\n"; // outputs 5
```
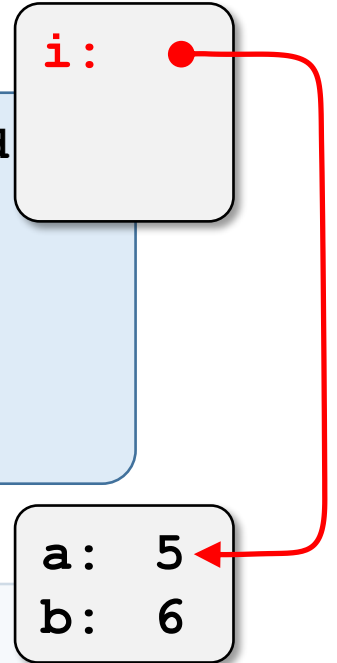
```
a:   5
b:   6
```

Exercise 1

Solution:

```cpp
// POST: the values of i and j are swapped
void swap (int& i, int& j) {
  const int h = i;
  i = j;
  j = h;
}
```

```cpp
int a = 5;
int b = 6;
swap(a, b);
std::cout << a << "\n"; // outputs 6
std::cout << b << "\n"; // outputs 5
```
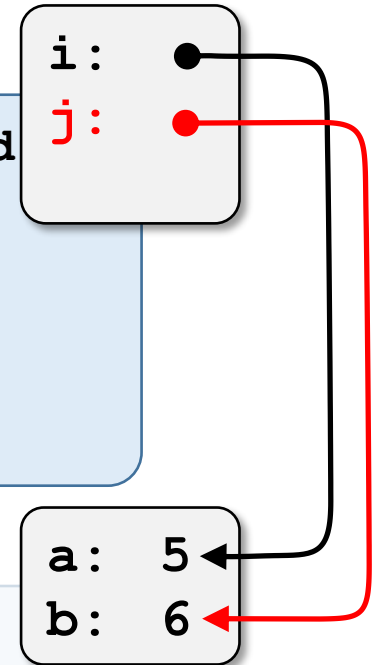
i:

a: 5
b: 6

Exercise 1

Solution:

```cpp
// POST: the values of i and j are swapped
void swap (int& i, int& j) {
  const int h = i;
  i = j;
  j = h;
}
```

```cpp
int a = 5;
int b = 6;
swap(a, b);
std::cout << a << "\n"; // outputs 6
std::cout << b << "\n"; // outputs 5
```
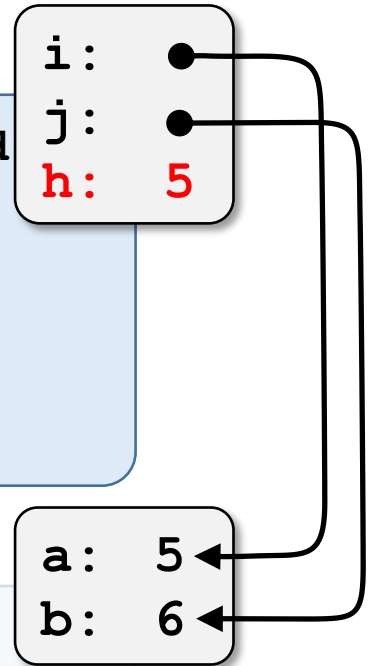
i:

j:

a: 5

b: 6

Exercise 1

Solution:

```cpp
// POST: the values of i and j are swapped
void swap (int& i, int& j) {
  const int h = i;
  i = j;
  j = h;
}
```

i: ●
j: ●
h: 5

a: 5
b: 6

```cpp
int a = 5;
int b = 6;
swap(a, b);
std::cout << a << "\n"; // outputs 6
std::cout << b << "\n"; // outputs 5
```

Exercise 1

Solution:

```cpp
// POST: the values of i and j are swapped
void swap (int& i, int& j) {
  const int h = i;
  i = j;
  j = h;
}
```

i: ●
j: ●
h: 5

```cpp
int a = 5;
int b = 6;
swap(a, b);
std::cout << a << "\n"; // outputs 6
std::cout << b << "\n"; // outputs 5
```

a: 6
b: 6

Exercise 1

Solution:

```cpp
// POST: the values of i and j are swapped
void swap (int& i, int& j) {
  const int h = i;
  i = j;
  j = h;
}
```

```cpp
int a = 5;
int b = 6;
swap(a, b);
std::cout << a << "\n"; // outputs 6
std::cout << b << "\n"; // outputs 5
```
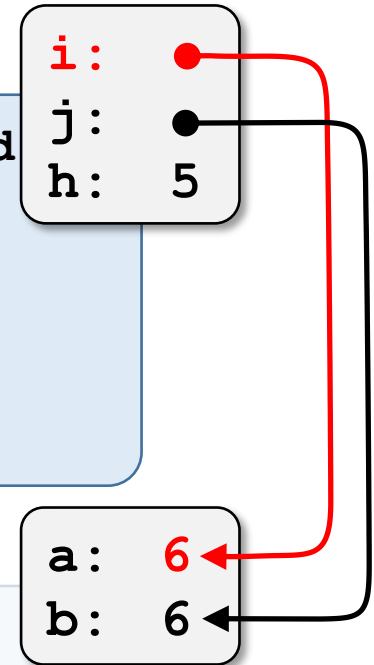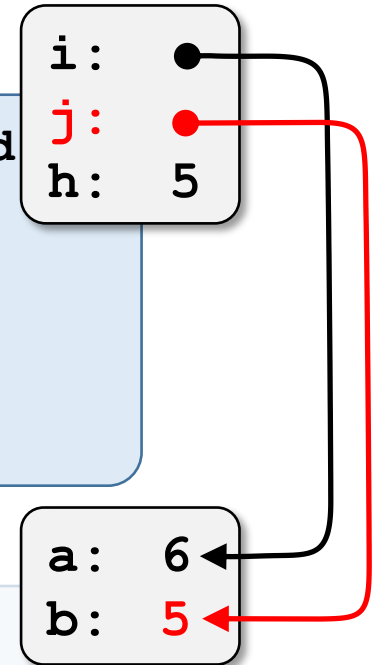
i: ●
j: ●
h: 5

a: 6
b: 5

Exercise 1

Solution:

```
// POST: the values of i and j are swapped
void swap (int& i, int& j) {
  const int h = i;
  i = j;
  j = h;
}
```

```
int a = 5;
int b = 6;
swap(a, b);
std::cout << a << "\n"; // outputs 6
std::cout << b << "\n"; // outputs 5
```

```
a:   6
b:   5
```

Exercise 1

Solution:

```cpp
// POST: the values of i and j are swapped
void swap (int& i, int& j) {
  const int h = i;
  i = j;
  j = h;
}
```

```cpp
int a = 5;
int b = 6;
swap(a, b);
std::cout << a << "\n"; // outputs 6
std::cout << b << "\n"; // outputs 5
```

```
a:  6
b:  5
```

Exercise 2

Exercise 2

(a)

What is the output of the program for the following variant of `foo`?

```cpp
int foo (int& a, int b) {
    a += b;
    return a;
}
```

```cpp
int main() {
    int a = 0;
    int b = 1;
    for (int i=0; i<5; ++i) {
        b = foo (a, b);
        std::cout << b << " ";
    }
    return 0;
}
```

Exercise 2

(a)

What is the output of the program for the following variant of `foo`?

```
1 2 4 8 16
```

```cpp
int foo (int& a, int b) {
  a += b;
  return a;
}
```

```cpp
int main() {
  int a = 0;
  int b = 1;
  for (int i=0; i<5; ++i) {
    b = foo (a, b);
    std::cout << b << " ";
  }
  return 0;
}
```

Exercise 2

(b)

What is the output of the program for the following variant of `foo`?

```cpp
int foo (int a, int b) {
  a += b;
  return a;
}
```

```cpp
int main() {
  int a = 0;
  int b = 1;
  for (int i=0; i<5; ++i) {
    b = foo (a, b);
    std::cout << b << " ";
  }
  return 0;
}
```

Exercise 2

(b)

What is the output of the program for the following variant of `foo`?

```
1 1 1 1 1
```

```cpp
int foo (int a, int b) {
  a += b;
  return a;
}
```

```cpp
int main() {
  int a = 0;
  int b = 1;
  for (int i=0; i<5; ++i) {
    b = foo (a, b);
    std::cout << b << " ";
  }
  return 0;
}
```

Exercise 2

(c)

What is the output of the program for the following variant of `foo`?

```
int foo (int a, int& b) {
  a += b;
  return a;
}
```

```
int main() {
  int a = 0;
  int b = 1;
  for (int i=0; i<5; ++i) {
    b = foo (a, b);
    std::cout << b << " ";
  }
  return 0;
}
```

Exercise 2

(c)

What is the output of the program for the following variant of `foo`?

```
1 1 1 1 1
```

```cpp
int foo (int a, int& b) {
  a += b;
  return a;
}
```

```cpp
int main() {
  int a = 0;
  int b = 1;
  for (int i=0; i<5; ++i) {
    b = foo (a, b);
    std::cout << b << " ";
  }
  return 0;
}
```