1 Exercises

Exercise 1. Consider the following functions:

```python
def f(x):
    return x + 1
def g(x):
    return x ** 2
def h(x):
    return x % 5
```

a. What does \( f(5) \) return?
b. What does \( g(f(5)) \) return?
c. What does \( h(g(f(5))) \) return?
d. What does \( f(g(h(17))) \) return?

Exercise 2. Consider the following function:

```python
def f(x, y, n = 1):
    return x ** n + y ** n
```

a. What does \( f(2, 3) \) return?
b. What does \( f(2, 3, 2) \) return?
c. What does \( f(n = 3, y = 2, x = 3) \) return?

Exercise 3. What does the following code fragment write?

```python
def duplicate(s):
    return s + s
s = 'Hello '
s = duplicate(s)
t = 'Bye'
t = duplicate(duplicate(duplicate(t)))
stdio.writeln(s + t)
```

Exercise 4. Consider the following code fragment:

```python
a = list(filter(lambda x: x % 7 == 0, range(1, 28)))
```

a. What is the value of \( a \)?
b. What does \( \text{sum}(a) \) return?

Exercise 5. Consider the following code fragment:

```python
import functools
a = list(map(lambda x: x + 2, range(1, 6)))
b = functools.reduce(lambda x, y: x + y, a)
```

a. What is the value of \( a \)?
b. What is the value of \( b \)?

Exercise 6. Consider the following program:
a. What does the program write in general?
b. What does the program write when run with the command-line arguments $a = 0$, $b = 2$, $c = 5$, and $x = 2$?
c. What is the value of $y$ in the following interactive Python session?

```
~/workspace/ipp/programs
>>> import mystery
>>> y = mystery.f()(3)
```

2 Solutions

Solution 1.

a. 6
b. 36
c. 1
d. 5

Solution 2.

a. 5
b. 13
c. 35


Solution 4.

a. [7, 14, 21]
b. 42

Solution 5.

a. [3, 4, 5, 6, 7]
Solution 6.

a. The program takes four floats $a$, $b$, $c$, and $x$ as command-line arguments and writes the value of the quadratic equation $ax^2 + bx + c$.

b. 9.0

c. 13.0