

Homework: Iteration

1.

- a.
- ```
int i = 0;
while (i < n) {
 if (i % i == 0) {
 out.print(i);
 }
 i++;
}
```
- b.
- ```
int i = 0;
while (i < n) {
    if (i % 10 == 0) {
        out.print(i);
    }
    i++;
}
```
- c.
- ```
int i = 0;
while (Math.pow(2, i) < n) {
 out.print(Math.pow(2, i));
 i++;
}
```

2.

a.

|               |                                                  |
|---------------|--------------------------------------------------|
|               | i = 0<br>j = 10<br>n = 0                         |
| while (i < j) |                                                  |
| i++           | i = 1 2 3 4 5<br>j = 10 9 8 7 6<br>n = 0 1 2 3 4 |
| j--           | i = 1 2 3 4 5<br>j = 9 8 7 6 5<br>n = 0 1 2 3 4  |
| n++           | i = 1 2 3 4 5<br>j = 9 8 7 6 5<br>n = 1 2 3 4 5  |
|               | <b>i = 5</b><br><b>j = 5</b><br><b>n = 5</b>     |

b.

|                |                                                                                 |
|----------------|---------------------------------------------------------------------------------|
|                | i = 0<br>j = 0<br>n = 0                                                         |
| while (i < 10) |                                                                                 |
| i++            | i = 1 2 3 4 5 6 7 8 9 10<br>j = 0 1 2 3 4 5 6 7 8 9<br>n = 0 0 1 2 3 4 5 6 7 8  |
| n = n + i - j  | i = 1 2 3 4 5 6 7 8 9 10<br>j = 0 1 2 3 4 5 6 7 8 9<br>n = 0 1 2 3 4 5 6 7 8 9  |
| j++            | i = 1 2 3 4 5 6 7 8 9 10<br>j = 1 2 3 4 5 6 7 8 9 10<br>n = 0 1 2 3 4 5 6 7 8 9 |
|                | <b>i = 10</b><br><b>j = 10</b><br><b>n = 9</b>                                  |

c.

|               |                                                                                        |
|---------------|----------------------------------------------------------------------------------------|
|               | i = 10<br>j = 0<br>n = 0                                                               |
| while (i > 0) |                                                                                        |
| i--           | i = 9 8 7 6 5 4 3 2 1 0<br>j = 0 1 2 3 4 5 6 7 8 9<br>n = 0 8 14 18 20 20 18 14 8 0    |
| j++           | i = 9 8 7 6 5 4 3 2 1 0<br>j = 1 2 3 4 5 6 7 8 9 10<br>n = 0 8 14 18 20 20 18 14 8 0   |
| n = n + i - j | i = 9 8 7 6 5 4 3 2 1 0<br>j = 1 2 3 4 5 6 7 8 9 10<br>n = 8 14 18 20 20 18 14 8 0 -10 |
|               | <b>i = 0</b><br><b>j = 10</b><br><b>n = -10</b>                                        |

d.

|                |                                                |
|----------------|------------------------------------------------|
|                | i = 0<br>j = 10<br>n = 0                       |
| while (i != j) |                                                |
| i = i + 2      | i = 2 4 6 8<br>j = 10 8 6 4<br>n = 0 1 2 3     |
| j = j - 2      | i = 2 4 6 8<br>j = 8 6 4 2<br>n = 0 1 2 3      |
| n++            | i = 2 4 6 8<br>j = 8 6 4 2<br>n = 1 2 3 4      |
|                | <b>Infinite loop</b><br><b>No final values</b> |

e.

|                |                                               |
|----------------|-----------------------------------------------|
|                | i = 3<br>j = 4<br>n = 0                       |
| while (i != 0) |                                               |
| n += j         | i = 3 2 1<br>j = 4 4 4<br>n = 4 8 12          |
| i--            | i = 2 1 0<br>j = 4 4 4<br>n = 4 8 12          |
|                | <b>i = 0</b><br><b>j = 4</b><br><b>n = 12</b> |

3.

```
int s = 0;
while (i <= 10) {
 s = s + i;
 i++;
}
```

4.

```
int i = 0;
while (i < n) {
 v += Math.pow(-1, i) / (2 * i + 1);
 i++;
}
v = v * 4
```

5.

```
while (n < areaBound && m < areaBound) {
 sum = Math.pow(n, 2) + Math.pow(m, 2);
}
```

6.

```
int i = 0;
while (abs(v - Math.PI()) < epsilon) {
 v += Math.pow(-1, i) / (2 * i + 1);
 i++;
}
v = v * 4
```