For this assignment, you can once again work with up to one partner, but you must write up all of your answers yourself. You can, however, have high-level discussions with your classmates.

You will submit this assignment electronically via Gradescope. You can either modify this PDF digitally and submit it to Gradescope, or print this out, write your answers on it, and take a clear photo of each page to submit. (Gradescope also has a mobile app, in case you find that more handy.)

1. For each of the following code fragments:
   - indicate how many times the output statement is displayed (the exact number, not an approximation, relative to n)
   - indicate whether that number is better described as $O(n)$ or $O(n^2)$
   - provide a brief but accurate justification of your answer

a)

```
for (i in 0..<n) {
    for (j in 0..<n) {
        println("$i $j")
    }
}
```

b)

```
for (i in 0..<n) {
    for (j in 0..<2) {
        println("$i $j")
    }
}
```


c)

```
for (i in 0..<n) {
    for (j in n-1 downTo 0) {
        println("$i $j")
    }
}
```

d)

```
for (i in 0..<n) {
    for (j in 0..<i) {
        if (j % i == 0) {
            println("$i $j")
        }
    }
}
```

2. For $f(n) = n^3 - 5n^2 + 20n - 10$, find values of n_0 and c such that cn^3 is larger than $f(n)$ for all n larger than or equal to n_0. Justify your answer (don't just write down n_0 and c).

3. Show that n^2 is $O(n^3)$ by using the definition of big-O.

4. Show that n^3 is not $O(n^2)$ by using the definition of big-O.

5. Reflection: Were there any particular issues your challenges you dealt with in completing this assignment? How long did you spend on this assignment?

   Write a brief discussion (a sentence or two is fine).

   Also include your collaboration statement here; if you worked alone, say so.