CSC165 Tutorial #7

Exercises

Winter 2015

Work on these exercises *before* the tutorial. You don't have to come up with complete solutions before the tutorial, but you should be prepared to discuss them with your TA.

IMPORTANT: Where applicable, you **must** use the proof structures and format of this course.

For this exercise, we will be using the following algorithm:

```
def meaning_of_life(A):
    """ A function that takes a list A and outputs t """
    # Precondition: ________________________________________

1.    n = len(A)
2.    t = 0
3.    if A[0] % 2 == 1:
4.        i = 0
5.        while i < n**2:
6.            t += A[i % n]
7.            i += 1
8.    else:
9.        i = n-1
10.       while i >= 0:
11.           t += A[i]
12.           i -= 1
13.   return t
```

1. Is there a precondition for `meaning_of_life`? Think about how a precondition for an algorithm relates to $B' \in \mathbb{N}$ for run-time proofs, and whether one is necessary in this case.
2. How many steps will `meaning_of_life` take for `A = [1, 2, 3]`? `A = [2, 1, 3]`?
3. What is the formula for the running time of `meaning_of_life`? What is the formula for the worst-case running time of `meaning_of_life`?

   If you're unsure of what the difference is, recall Q3 from Tutorial 6.
4. Prove of disprove: `meaning_of_life` $\in \Omega(n^3)$.