CSC236 Tutorial Exercises, Mar 9/10

Here are your tutorial sections:

<table>
<thead>
<tr>
<th>Surname</th>
<th>Time</th>
<th>Room</th>
<th>TA</th>
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<tbody>
<tr>
<td>A-K</td>
<td>Thursday 6-7pm</td>
<td>BA2145</td>
<td>Ethan</td>
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<tr>
<td>L-R</td>
<td>Thursday 6-7pm</td>
<td>BA2155</td>
<td>Zach</td>
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<tr>
<td>S-Z</td>
<td>Thursday 6-7pm</td>
<td>BA2175</td>
<td>Ekansh</td>
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<td>A-H</td>
<td>Friday 11am-12pm</td>
<td>UC85</td>
<td>Wen</td>
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<td>I-R</td>
<td>Friday 11am-12pm</td>
<td>UC87</td>
<td>Felipe</td>
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<td>S-Z</td>
<td>Friday 11am-12pm</td>
<td>UC144</td>
<td>Ryan</td>
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These exercises are to give you practice with loop invariants and iterative algorithms.

1. Consider the following algorithm:

```python
func(n):
    # Pre: n is a natural number
    x = 0
    i = 0
    while i < n:
        i = i + 1
        x = x + i
    return x
```

(a) State postconditions for this algorithm.
(b) Use induction to prove the loop invariants $i \leq n$ and $x = \sum_{j=0}^{i} j$ for the while loop.
(c) Prove that the loop terminates.

2. Prove that the following function is correct (by showing partial correctness and termination), according to its pre- and postconditions.

```python
def f(A):
    # Pre: A is a list of integers
    # Post: Returns true if and only if there is an even number of positive
    # numbers in A
    even = True
    i = 0
    while i < A.length:
        if A[i] > 0:
            even = not even
            i = i + 1
    return even
```