EXERCISES- Invariants

1. Given the loop invariant below:

i == 0 and x == arglist[0]
or
(i > 0 and x is the max of the list elements from arglist[0] up to arglist[i-1])

write the code to check the invariant.

```
def foo_invariant(arglist, i, x):
```

2. Write the loop invariants for the following code:

```
def foo(x):    # x is a list
    y = [ ]
    i = len(x) - 1
    while i >= 0:
        y.append(x[i])    # attach x[i] to the end of y
        i -= 1

    return y
```

a) First, understand what the code is doing. If `x` is the list defined below

```
x = [4,5,6,7,8]
```

What are the contents of list `y` be when the loop completes?

b) Write out the contents of list `y` for each iteration when `x = [4,5,6,7,8]`

c) Write out the equivalences of `y` and `x` in terms of their elements, starting from index 0.

d) Write out the invariant.

e) Write the code to check the invariant.

3. Write the following expression without using an if statement:

```
if w == u:
    return True
else:
    return False
```