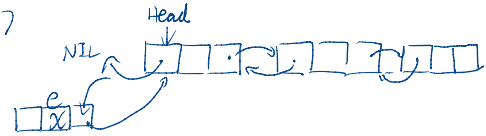
a) Insert_double_list(L, x)




```
e ← new element
e.key ← x
e.next ← L.head
if L.head ≠ ϕ then
    L.head.prev = e
L.head = e
Return L
```

Asymptotic running time: O(n), n is the number of elements in the list.

```
Search_double_list(L, x)
    e ← L.head
    while e ≠ NIL and e.key ≠ x do
    |   e ← e.next
    return e
```

Asymptotic running time: O(n), n is the length of the list.

b) Extend_lists(A, B)

```
if B ≠ ϕ and A ≠ ϕ then
    A_last ← A.head
    while A_last.next ≠ ϕ do
        A_last ← A_last.next
    end while
    A_last.next ← B.head
    B.head.prev ← A_last
    return A
```

c) Zip_lists(A, B)

```
i ← 1
a_i ← A.head
b_i ← B.head
while a_i ≠ ϕ and b_i ≠ ϕ do
        a_{i+1} ← a_i.next
        b_{i+1} ← b_i.next
        a_i.next ← b_i
        b_i.prev ← a_i
        b_i.next ← a_{i+1}
        a_{i+1}.prev ← b_i
        a_i ← a_{i+1}
        b_i ← b_{i+1}
        i ← i+1
end while
if b_i ≠ ϕ then
    extend_lists(A, B)
end if
return A
```