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#ShowSearch.py
""" Includes implementations of linear and binary search
and an
application script that checks them out on
a small example.
"""

def
BinSearch(x,a):
    """ Returns an int k with the property that
    a[k]==x is
True. If no such k exists, then
    -1 is returned.

    PreC: a is a nonempty list of ints
that is sorted from smallest
    to largest. x is an int.
    """
    if
x<a[0] or x>a[-1]:
        # x is outside the interval [a[0],a[-1]]
        return -1

L = 0
    R = len(a)-1
    while R-L > 1:
        assert a[L]<=x<=a[R], 'x is not in
interval [a[L],a[R]]'
        mid = (L+R)/2
        if x < a[mid]:
            R = mid

  else:
            L = mid
    assert a[L]<=x<=a[L+1], 'R does not equal L+1'
    if
a[L]==x:
        return L
    elif a[L+1]==x:
        return L+1
    else:
        return -1


def LinSearch(x,a):
    """ Returns an int k with the property that

a[k]==x is True. If no such k exists, then
    -1 is returned.

    For-loop
implementation.

    PreC: a is a nonempty list of ints. x is an int.

"""
    for  k in range(len(a)):
        if a[k]==x:
            return k
    #
if the loop runs to completion, then no element of a has the
    # same value as x.
    return
-1

def LinSearchW(x,a):
    """ Returns an int k with the property that

a[k]==x is True. If no such k exists, then
    -1 is returned.

    While-loop
implementation.
```

```
    PreC: a is a nonempty list of ints. x is an int.

"""
    k=0
    while k<len(a) and x!=a[k]:
        k+=1
    if k<len(a):

       # The loop terminated because x==a[k] is true
        return k
    else:
        # No
value element of a has the same value as x
        return -1

if __name__ == '__main__':

""" Illustrates the use of several search algorithms
    applied to a small list
problem."""

    a = [10,10,20,30,30,40,50,50]
    print a
    x =
float(raw_input('Enter x: '))
    iB = BinSearch(x,a)
    iL = LinSearch(x,a)
    iLW =
LinSearchW(x,a)
    print ' BinSearch(x,a)  returns %1d' % iB
    print ' LinSearch(x,a)
returns %1d' % iL
    print 'LinSearchW(x,a)  returns %1d' % iLW
```