

Assignment Project Exam Help

Sequences

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Box-and-Pointer Notation
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The Closure Property of Data Types

- A method for combining data values satisfies the *closure property* if:

The result of combination can itself be combined using the same method

- Closure is powerful because it permits us to create hierarchical structures
- Hierarchical structures are made up of parts, which themselves are made up of parts, and so on

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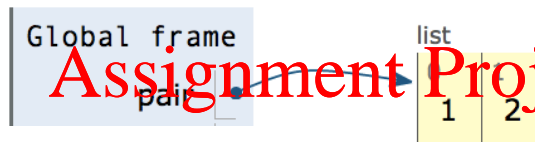
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Lists can contain lists as elements (in addition to anything else)

Box-and-Pointer Notation in Environment Diagrams

Lists are represented as a row of index-labeled adjacent boxes, one per element

Each box either contains a primitive value or points to a compound value



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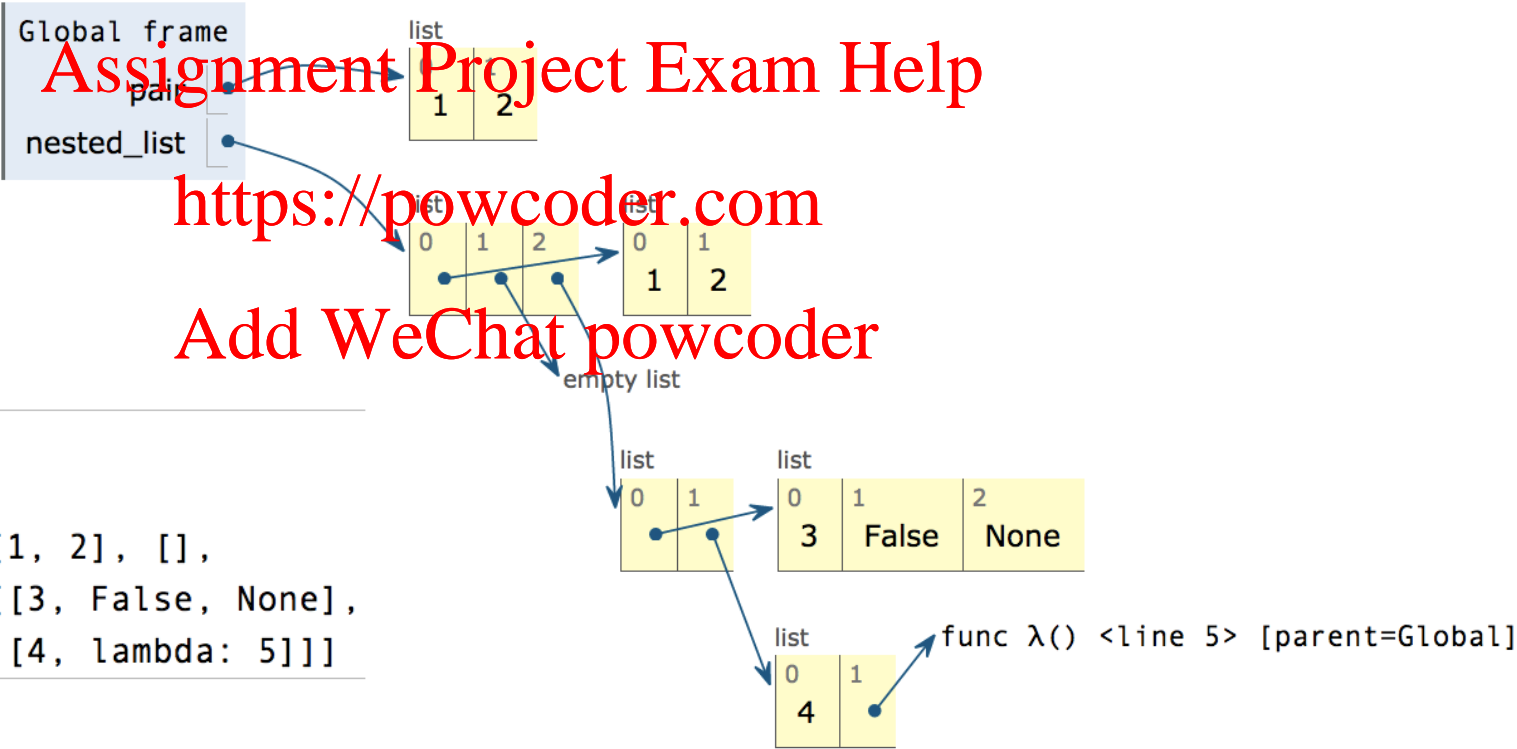
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```
pair = [1, 2]
```

Box-and-Pointer Notation in Environment Diagrams

Lists are represented as a row of index-labeled adjacent boxes, one per element
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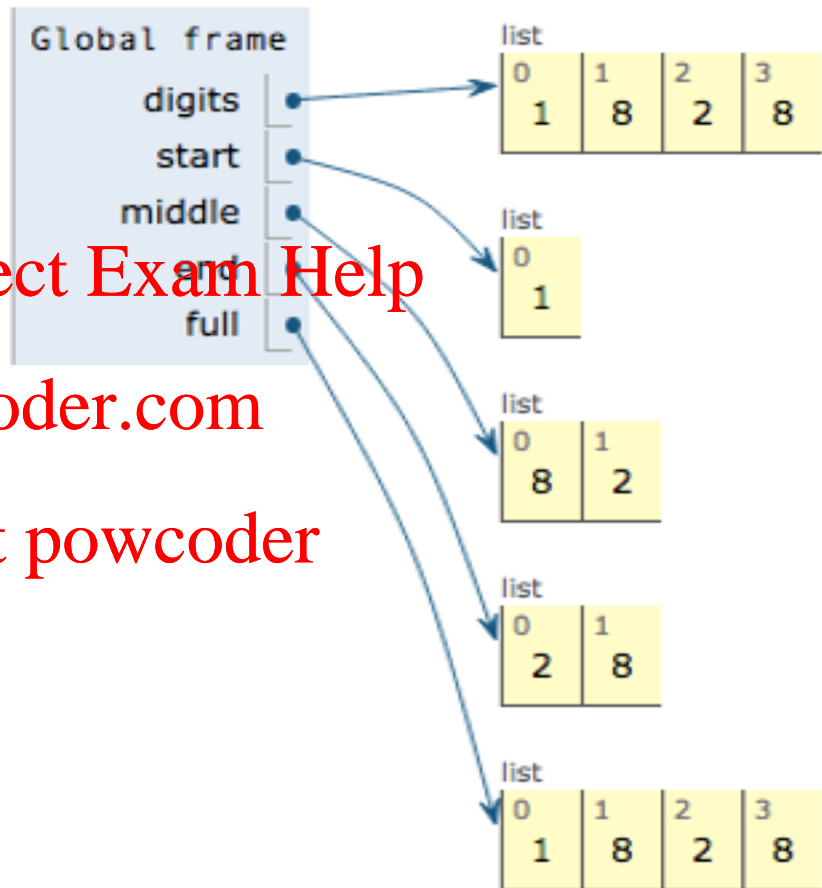
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(Demo)

Slicing Creates New Values

```
1 digits = [1, 8, 2, 8]
2 start = digits[:1]
3 middle = digits[1:3]
4 end = digits[2:]
5 full = digits[:]
```



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Processing Container Values
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Sequence Aggregation

Several built-in functions take iterable arguments and aggregate them into a value

- **sum**(iterable[, start]) -> value

Return the sum of an iterable (not of strings) plus the value of parameter 'start' (which defaults to 0). When the iterable is empty, return start.

- **max**(iterable[, key=func]) -> value
max(a, b, c, ...[, key=func]) -> value

With a single iterable argument, return its largest item.
With two or more arguments, return the largest argument.

- **all**(iterable) -> bool

Return True if bool(x) is True for all values x in the iterable.
If the iterable is empty, return True.

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[Recursive Sums
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Sum (recursively)

```
def mysum(L):  
    if (L == []):  
        return 0
```

```
    else:  
        return L[0] + mysum( L[1:] )
```

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```
mysum( [2, 4, 1, 5] )  
2 + mysum( [4, 1, 5] )  
  4 + mysum( [1, 5] )  
    1 + mysum( [5] )  
      5 + mysum( [] )  
        0
```

```
# --- DRILL ---  
# Write an iterative function that takes as input  
# integer "n" and returns the sum of the first "n"  
# integers: sum(5) returns 1+2+3+4+5
```

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```
# --- DRILL ---  
# Write an iterative function that takes as input  
# integer "n" and returns the sum of the first "n"  
# integers: sum(5) returns 1+2+3+4+5
```

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```
def sum_iter(n):  
    sum = 0  
    for i in range(0,n+1):  
        sum = sum + i  
  
    return( sum )
```

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```
# --- DRILL ---  
# Write a recursive function that takes as input  
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# --- DRILL ---  
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```

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```
def sum_rec(n):  
    if( n == 0 ):  
        return(0)  
    else:  
        return n + sum_rec(n-1)
```

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Reversing a String
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Reversing a List (recursively)

`reverse("ward") = "draw"`

`reverse("ward") = reverse("ard") + "w"`

`reverse("ard") = reverse("rd") + "a"`

`reverse("rd") = reverse("d") + "r"`

`reverse("d") = "d"`

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Reversing a List (recursively)

```
reverse("ward") = "draw"
```

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```
reverse("ward") = reverse("ard") + "w"
```

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```
reverse("ard") = "d" + "r" + "a"
```

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Reversing a List (recursively)

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```
def reverse(s):  
    if len(s) == 1:  
        return s  
    else:  
        return reverse(s[1:]) + s[0]
```

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