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6.00 Introduction to Computer Science and Programming
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6.00 Quiz 2 Practice Problem Solutions

Problem 1

1. False. 2. True. 3. False. 4. False. 5. True. 6. False.

Problem 2

```
def findMedian(L):
    if len(L) == 0: raise ValueError("Empty list")
    copy = L[:]
    copy.sort()
    if len(copy) % 2 == 1:
        return copy[len(copy) / 2]
    else:
        return (copy[len(copy) / 2] + copy[len(copy) / 2 - 1]) / 2
```

Problem 3

16.0
Circle with radius 4
Circle with radius 8

Problem 4

- n — total number of items
 - p_i — value of item i
 - x_i — value is 1 if item i is taken; 0 otherwise
 - w_i — weight of item i
 - C — maximum weight allotted
2. Maximize formula 1 while obeying the constraint of formula 2.

Problem 5

If the list is of length 0 or 1, then return the list
Otherwise,

Divide list into left and right subsets of about the same size
Sort each sublist recursively by re-applying merge sort
Merge the returned (sorted) sublists

Problem 6

```
def findNumber(maxVal):
    """
    Assumes that maxVal is a positive integer. Returns a number, num,
    such that cmpGuess(num) == 0
    """
    s = range(0, maxVal)
    return bsearch(s, 0, len(s) - 1)

def bsearch(s, first, last):
    if (last - first) < 2:
        if cmpGuess(s[first]) == 0:
            return first
        else:
            return last
    mid = first + (last - first)/2
    if cmpGuess(s[mid]) == 0:
        return s[mid]
    if cmpGuess(s[mid]) == -1:
        return bsearch(s, first, mid - 1)
    return bsearch(s, mid + 1, last)

def cmpGuess(guess):
    """
    Assumes that guess is an integer in range(maxVal).
    Returns -1 if guess is < magic number, 0 if ==, 1 if >
    """
```