Homework 2

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Listing 1: Problem 1

```
"""
 * ============================================================================
 *
 *        Filename:  HW2Prob1Brodskiy.py
 *        Assignment: Homework 2 Problem 1
 *        Title: Temperature Converter
 *
 *    Description:  Uses function c_to_f to print a table of
    Celsius and Fahrenheit values from -10C to 100C
 *
 *         Version:  1.0
 *         Created:  02/09/2023
 *        Revision:  N/A
 *          Python:  Python 3.9.2
 *
 *          Author:  M. Brodskiy
 *
 * ============================================================================
"""

def c_to_f(fahrenheit):
    return ( 9.0 / 5.0 ) * float(fahrenheit) + 32

print("Celsius\tFahrenheit")
for i in range(-10, 101):
    print(f"{i:.2f}\t{c_to_f(i):.2f}")
```

Listing 2: Problem 2

```
"""
 * ============================================================================
 *
 *        Filename:  HW2Prob2Brodskiy.py
 *        Assignment: Homework 2 Problem 2
 *        Title: Sum_Product
 *
 *    Description:  Uses function Sum_Product to either sum or
    multiply all elements in a list
 *
 *         Version:  1.0
 *         Created:  02/09/2023
 *        Revision:  N/A
 *          Python:  Python 3.9.2
 *
 *          Author:  M. Brodskiy
 *
 * ============================================================================
"""

def sum_product(in_list, in_mode = 0):
    sum_or_product = 1
    if in_mode == 0:
        for i in in_list:
            sum_or_product += i
        return (min(in_list), sum_or_product - 1)
    else:
        for i in in_list:
            sum_or_product *= i
        return (max(in_list), sum_or_product)
```

Listing 3: Problem 3

```
"""
 * ============================================================================
 *
 *        Filename:  HW2Prob3Brodskiy.py
 *        Assignment: Homework 2 Problem 3
 *        Title: Palindrome Detector
 *
 *    Description:  Uses function is_palindrome to detect palindromes
 *
 *         Version:  1.0
 *         Created:  02/09/2023
 *        Revision:  N/A
 *          Python:  Python 3.9.2
 *
 *          Author:  M. Brodskiy
 *
 * ============================================================================
"""

def is_palindrome(word):
    return word.lower().replace(" ","") == word.lower().replace(" ","")[::-1]
```

Listing 4: Problem 4

```
"""
 * ============================================================================
 *
 *       Filename:  HW2Prob4Brodskiy.py
 *       Assignment: Homework 2 Problem 4
 *       Title: Tortoise and the Hare
 *
 *    Description:  Simulates the Tortoise and Hare race using functions tortoise_prob and hare_prob
 *
 *        Version:  1.0
 *        Created:  02/09/2023
 *       Revision:  N/A
 *         Python:  Python 3.9.2
 *
 *         Author:  M. Brodskiy
 *
 * ============================================================================
"""
import random

def tortoise_prob():
    rand = random.randint(1,21)
    if rand <= 8:
        return 3
    elif rand <= 10:
        return -6
    else:
        return 1

def hare_prob():
    rand = random.randint(1, 11)
    if rand <= 1:
        return 0
    elif rand <= 4:
        return 9
    elif rand <= 5:
        return -12
    elif rand <= 7:
        return 1
    else:
        return -2

```

```
43 def simulate():
44
45     print("BANG! AND THEY'RE OFF!!!!!")
46
47     posHare = 1
48     posTortoise = 1
49
50     for i in range(95):
51         print("-",end="")
52     print("")
53
54     while posTortoise < 95 and posHare < 95:
55
56         posHare += hare_prob()
57         posTortoise += tortoise_prob()
58
59         if posHare <= 0:
60             posHare = 1
61         if posTortoise <= 0:
62             posTortoise = 1
63
64         if posHare >= 95 or posTortoise >= 95:
65             break
66
67         for i in range(95):
68             if  i == posTortoise == posHare:
69                 print("OUCH!!!",end="")
70             elif i == posHare:
71                 print("H",end="")
72             elif i == posTortoise:
73                 print("T",end="")
74             else:
75                 print("-",end="")
76
77         print("")
78
79     print("")
80
81     if posHare >= 95 and posTortoise >= 95:
82         return 0
83     else:
84         return 1 if posHare >= 95 else 2
85
86 TWins = 0
87 HWins = 0
```

```
88
89 for i in range(50):
90     result = simulate()
91     if result == 1:
92         HWins += 1
93     elif result == 2:
94         TWins += 1
95
96 print(f"The tortoise won {TWins} times, the hare won {HWins} times
   , and they tied {50 - HWins - TWins} times")
```

Listing 5: Problem 5

```
"""
 * ============================================================================
 *
 *       Filename:  HW2Prob5Brodskiy.py
 *       Assignment: Homework 2 Problem 5
 *       Title: The Sieve of Eratosthenes
 *
 *    Description:  Finds prime numbers through the use of a
    boolean list
 *
 *        Version:  1.0
 *        Created:  02/10/2023
 *       Revision:  N/A
 *         Python:  Python 3.9.2
 *
 *         Author:  M. Brodskiy
 *
 * ============================================================================
"""

def Sieve_of_Eratosthenes(K):
    list_of_primes = [True for i in range(K + 1)]
    list_of_primes[0], list_of_primes[1] = False, False

    index = 2
    while index ** 2 <= K:
        if list_of_primes[index]:
            for j in range(index ** 2, K + 1, index):
                list_of_primes[j] = False
        index += 1

    return list_of_primes
```

Listing 6: Problem 7

```
"""
 * =============================================================================
 *
 *       Filename:  HW2Prob7Brodskiy.py
 *       Assignment: Homework 2 Problem 7
 *       Title: Tuple Manipulations
 *
 *    Description:  Performs various manipulations of tuple lists
    containing hardware items
 *
 *        Version:  1.0
 *        Created:  02/09/2023
 *       Revision:  N/A
 *         Python:  Python 3.9.2
 *
 *         Author:  M. Brodskiy
 *
 * =============================================================================
"""

import operator

# Define tuple list
items = [("38", "Electric sander", 11, 24.09), ("42", "Power saw",
    18, 89.82), ("77", "Sledge hammer", 7, 57.98), ("7", "Hammer",
    76, 11.99)]

# Part a
items_sorted = sorted(items, key=operator.itemgetter(1))
print(items_sorted)

# Part b
desc_and_quant = []
for i in items:
    desc_and_quant.append((i[1], i[2]))

desc_and_quant = sorted(desc_and_quant, key=operator.itemgetter(1)
   )
print(desc_and_quant)

# Part c
desc_and_val = []
for i in items:
```

```
40      desc_and_val.append((i[1], i[2] * i[3]))
41
42  desc_and_val = sorted(desc_and_val, key=operator.itemgetter(1))
        [::-1]
43  print(desc_and_val)
44
45  # Part d
46  for i in desc_and_val:
47      if i[1] > 1000 or i[1] < 200:
48          desc_and_val.pop(desc_and_val.index(i))
49  print(desc_and_val)
50
51  # Part e
52  sum = 0
53  for i in desc_and_val:
54      sum += i[1]
```