Worksheet: while loops

COSC 101, 2018-03-09

1) Warm-up
Write a function called distances that takes a list of distances in kilometers and converts each distance to meters and computes the average distance in meters. The function should return the list of distances in meters and the average distance in meters. The original list should not be modified.

2) while loops
What is the output of each of the following programs?

a) total = 1
   while total < 16:
   total = total * 2
   print(total)

b) a = 6
   b = 5
   while a >= 0 and b > 0:
   print(a, b)
   a = a - 2
   b = b - 1

c) primes = [2, 3, 5, 7]
   i = 0
   while i < len(primes):
   print(primes[i])
   i += 1

d) i = 1
   while i < 5:
   if i % 3 == 1:
   i = i + 1
   elif i % 3 == 2:
   i = i - 1
   print(i)
3) for loops versus while loops
Rewrite each of these programs to use a while loop instead of a for loop.

a) for i in range(5):
   print(i*2)

b) values = [95, 90, 85, 80]
   result = 0
   for v in values:
       result = result + v
   print(result/4)

Programming practice
a) Discount Airlines, Inc. has asked you to write a program to help its customers calculate how many reward miles they have earned. Your program should repeatedly ask the user for the distance of a flight until the user enters 0. Then your program will output the total number of miles flown and whether the customer achieved bronze (less than 20,000 miles flown) or silver (at least 20,000 miles flown) status.
   Your output must exactly match the format of this example:
   What was the distance of flight 1? 1000
   What was the distance of flight 2? 5000
   What was the distance of flight 3? 2000
   What was the distance of flight 4? 0
   You flew 8000 miles.
   You earned bronze status.
b) Write a program that calculates the total purchase amount charged by an online retailer. The program should ask for the merchandise subtotal and the desired shipping speed, then calculate the shipping cost and the applicable tax (both merchandise and shipping are taxed) and finally, display the total cost. Standard shipping costs $8, 2-day shipping $16 and next day $25. Customers get free standard shipping if their merchandise total is over $75 and they choose standard shipping. The program should re-prompt the user for their shipping choice if the input does not match one of the available shipping options. The tax rate that should be used is four percent.

Your output must exactly match the format of this example:

Order sub-total: 82.93
Select Shipping Speed: (S)tandard, (2)-Day, or (N)Next Day E
Invalid choice
Select Shipping Speed: (S)tandard, (2)-Day, or (N)Next Day S
The total cost is: $86.25

c) Extend the above program to ask the user for the cost of each item until they enter a cost of zero. Compute the merchandise subtotal based on the cost of each item.
d) Write a function called `sums` that takes a list of sublists of integers and replaces each sublist with the sum of the numbers in the sublist. The function should return the maximum sum and the minimum sum.