

Exercises: Chapter 2-3

Chapter 2:

1. Write pseudocode instructions that carry out each of the following computational operations:
 - a. Determine the area of a triangle given values for the base b and the height h .
 1. $\text{Area} = \text{Base} * \text{Height} / 2$. $A = B * H / 2$.
 2. Get values for base (B), and height (H).
 3. Multiply base and height and divide the result by 2
 4. Store result as area (A)
 5. Stop
 - b. Compute the interest earned in 1 year given the starting account balance (B) and the annual interest rate (I) and assuming simple interest. Also determine the final balance at the end of the year.
 1. Get values for interest (I) and starting account balance (B)
 2. Multiply interest rate (I) by account balance (B) and store value in interest earned (IE)
 3. Add interest earned (IE) to account balance (B) and store value in end of year (EOY)
 4. Stop
 - c. Determine the flying time between two cities given the mileage M between and the average speed of the airplane.
 1. Get value for mileage
 2. Get average speed (For fun I'm pretending the average speed has to be calculated from a list of recorded speeds.) Example: speeds = [200, 250 , 275, 200, 100]
 3. Create three variables, L , T , and average_speed .
 - a. L is the length of the list
 - b. T is the total of the speeds and starts at 0
 - c. average_speed is the average speed.
 4. For each number in the speeds list, add the number to total (T).
 5. When the list is exhausted, divide the total (T) by the list length (L) and store it in avg_speed .
 6. Create a variable time (T), (in hours) and set it to 0
 7. $\text{Time} = \text{distance/speed}$.
 8. Find time by dividing mileage (M) by speed (avg_speed) and store in time (T)
 9. Stop

Chapter 3:

- a. Use Gauss's formula to find the total number of gifts given on day 12.

$$\Sigma = \frac{n(n+1)}{2} - \text{Gauss's formula}$$

n is the last number in the sequence (and largest).

$$\text{Total gifts} = 12 * 13 / 2 = 78$$

which is the equivalent to

$$1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 + 11 + 12 = 78$$

This sequence can be broken up into pairs that equal 13. (This would be the n + 1 in the formula)

$$1 + 12, 2 + 11, 3 + 10, 4 + 9, 5 + 8, 6 + 7$$

There are 6 pairs of 13 that can be created (half of n which in this case is 12)

$$\text{therefore } 13 * 6 = 78$$

This proves the formula in the beginning

- b. How many total gifts were given over all 12 days?

$$\text{The formula} - \frac{n(n+1)(n+2)}{3}$$

Which with 12 as n, would be:

$$12 * 13 * 14 / 3 = 728 \text{ total gifts.}$$