

SCHEME LAB 1

FUNCTIONS AND VARIABLES

This lab will give you practice with Dr. Scheme, developing and testing small functions to solve a given problem. A full design recipe is expected for every function you write to solve a problem.

Exercises

1. Using Problem 1 from Lab 0, create a function called ***paycheck*** that consumes the hours the boy worked in the month and calculates his monthly paycheck.
2. Using Problem 2 from Lab, create a function ***rocket-height*** that consumes a time t and produces the height of the rocket after t seconds.
3. Define the function ***slope*** that takes input of four numbers. The first two numbers represent x,y coordinates for one point on a line. The third and fourth numbers represent x,y coordinates for a second point on a line. The function will output the slope of the line.
4. Define the function ***image-area***, which computes the area of a given image.
Note: The area is also the number of pixels in the picture.
5. Define the function ***string-insert***, which consumes a string and a number i which inserts "_" between the i th and the $i+1$ st position of the string. Assume i is a number between 0 (inclusive) and the length of the given string (inclusive).
For example, (string-insert "hello" 1) should produce "he_llo".

Dessert



6. Develop a function ***number-of-tiles*** that when given the length and width of a rectangular floor and the edge length of a square tile will compute the whole number of tiles needed to cover the floor completely.
7. The nation of Progressiva has a simple tax code. The tax you pay is your salary times the tax rate, and the tax rate is $1/2\%$ per thousand dollars of salary. For example, if you make \$40,000, your tax rate is $1/2\%$ times 40, which is 20%, so you pay 20% of \$40,000, which is \$8,000.

Develop a function ***net-pay*** to compute the net pay (i.e. pay after taxes) of a person with a given salary. HINT: develop one or two auxiliary functions as well as ***net-pay***.

This tax system has the peculiar feature that, beyond a certain income level, it doesn't pay to earn any more: for every additional dollar you earn, you have to pay MORE than a dollar more to the government. Use your net-pay function to find this income level. Add the answer as a comment in your Scheme file.

8. Define the function ***string-swap***, which takes a string and a number which is the index into the string. The result is the string with the characters up to the index swapped with the characters after the index. Assume index starts at zero.
For example: (string-swap "hello" 2) would produce "lohel"
9. Define the function ***char-swap***, which takes a string and 2 numbers. The result is the string with the characters in those two positions swapped. Assume index starts at zero.
For example: (char-swap "hello" 1 4) should produce ("holle")