Assignment 1

15CSE220 :: SICP

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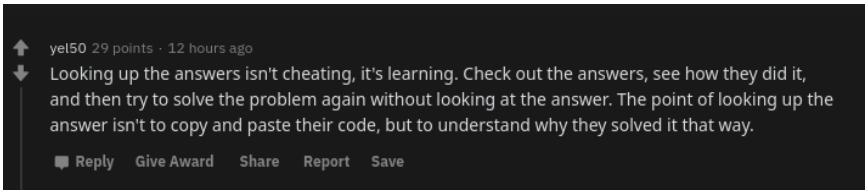
1 Before we start

We strongly encourage you to try all the problems as they are very easy to solve. Solutions are available around the web. We strongly discourage **copy/paste** from either your classmates or from web. As an example, from Reddit answers,



we understand that looking at answers is not a wrong thing if you do it earnestly.

Still, if you are lazy, and like to copy/paste, please read the answer from Quora.

How do interviewers find out that a candidate is cheating in a technical telephone interview/onsite interview?

We have mechanisms in place to know whether it is your effort or others effort.

Don't cheat. After all, you can cheat only you and not others.

2 Questions

1. Evaluate the following expressions

   (a) 10

(b) (+ 5 3 4)
(c) (- 9 1)
(d) (/ 6 2)
(e) (+ (* 2 4) (- 4 6))
(f) (+ 1/2 1/2)
(g) (- 1.5 1/2)
(h) (* 3 1/2)
(i) (/ 1.5 3/4)
(j) (+ (+ 2 2) (+ 2 2))
(k) (- 2 (* 4 1/3))
(l) (* 2 (* 2 (* 2 (* 2 2))))
(m) (/ (* 6/7 7/2) (- 4.5 1.5))

2. Evaluate the following expressions

(a) (define a 3)
(b) (define b (+ a 1))
(c) (+ a b (* a b))
(d) (= a b)

3. Write the prefix notation for the following equation.

$$\frac{5+4+(2-(3-(6+\frac{4}{5})))}{3(6-2)(2-7)}$$

4. Convert the following arithmetic expressions into Scheme expressions and evaluate them.

a. 1.2 × (2 - 1/3) + -8.7
b. (2/3 + 4/9) ÷ (5/11 - 4/3)
c. 1 + 1 ÷ (2 + 1 ÷ (1 + 1/2))
d. 1 × -2 × 3 × -4 × 5 × -6 × 7

5. Write a procedure **(!= x y)** which returns **#f** if **x = y**, **#t** otherwise.
6. Imagine that **Scheme** or **Lisp** uses **infix notation** for evaluation. What additional step has to be taken for evaluating **expressions** according to you. (Hint: You studied in Compilers)
7. If you type **(1 2 3 4)**, it will throw an error. On the other hand, if you type **'(1 2 3 4)** it will accept. Give reason for this behaviour.
8. List the features you enjoy most in your favourite programming language which are absent in **Scheme**.
9. In lecture 2, when we typed "Hello World" Dr.Racket printed "Hello World" back. Why? Can you guess the reason?