LISP Programming Worksheet
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School ACSL Club of 2014–2015

You may not need to know all of this material for the next contest! Problems 1 and 2 are representative of problems you may see on contest #2. Problems 3 through 5 are representative of problems you may see on contest #4.

Questions

Evaluate the following LISP code.

1. `(DIV 24 (SUB 2 5))`

2. ```
   (ADD (MULT 48 40)
        (SUB (SQUARE 9) 1)
        (MULT 3 5))
   ```

3. What is the final returned value of the program?

   ```
   (SETQ a 'hello)
   (ATOM a)
   ```

4. What is the final value of `b` after this program is run?

   ```
   (SETQ b '((what) is a list "?"))
   (CONS (CAR b) (CDR b))
   (SETQ b (CONS (CAR (CAR b)) (CDR b)))
   ```

5. What is the final returned value of the program?

   ```
   (SET 'c '(21 22 23 50))
   (SETQ d (CONS 33 (CDR (CDR c))))
   (REVERSE d)
   ```

Answers

1. `(DIV 24 -3)`
   `-8`

2.

   `(ADD (MULT 48 40) (SUB 81 1) (MULT 3 5))`
   `(ADD 1920 80 15)`
   `2015`

3.

`(SETQ a 'hello)`	Set variable `a` to symbol `hello`.
`(ATOM a)`	Returns true, since `a` is not a list.

4.

`(SETQ b '((what) is a list "?"))`	Set variable `b` to list containing elements: (a) A list containing one element, the symbol `what`. (b) The symbol `is`. (c) The symbol `list`. (d) The string "?".
`(CONS (CAR b) (CDR b))`	Creates the list `((what) "?")`.
`(SETQ b (CONS (CAR (CAR b)) (CDR b)))`	Changes the value of the first element in `b` to the first element in the list `(what)`, the symbol `what`.

   Therefore, the value of `b` is `(what is a list "?")`.

5.

```
(SET 'c '(21 22 23 50))              Set variable c to list
                                     containing elements 21,
                                     22, 23, and 50.
(SETQ d (CONS 33 (CDR (CDR c)))      Set variable d to list
                                     containing elements 33
                                     and 50.
(REVERSE d)                          Returns (50 33).
```