LISP Programming Worksheet
Created by Sam Craig and Christopher Cooper for the West Lafayette High School ACSL Club of 2014–2015

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

4.
```
(SETQ b '((what) is a list "?"))
(CONS (CAR b) (CDR b))
(SETQ (CAR b) (CAR (CAR b)))
```

5.
```
(SET 'c '(21 22 23 50))
(SETQ (CDR (CDR c)) (CONS 33 NIL))
(REVERSE c)
```

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. $$\begin{array}{r} 21\text{A}7 \\ -\ 11\,0 \\ \hline 209\,7 \end{array}$$

5. $$\begin{array}{r} {\scriptstyle 1} \\ 10531 \\ +12414 \\ \hline 23145 \end{array}$$

6. $$\begin{array}{r} {\scriptstyle 1\,0} \\ -\,1\,11011 \\ \hline 1\,10100 \end{array}$$

7. $$3\text{C}0_{16} = 0011\ 1100\ 0000_2$$

$$340_8 = 011\ 100\ 000_2$$

$$\begin{array}{r} {\scriptstyle 1\ 11\ 1\ \ \ \ \ \ \ \ \ \ } \\ 1111000000 \\ +\quad 11100000 \\ \hline 10010100000 \end{array}$$

$$\begin{aligned} 10010100000_2 &= 100\ 1010\ 0000_2 \\ &= 4\text{A}0_{16} \end{aligned}$$

8.

$$\begin{aligned} 6\text{FAC}_{16} &= 0110\ 1111\ 1010\ 1100_2 \\ &= 01101\ 111\ 101\ 01100 \end{aligned}$$

so

$$\begin{aligned} \text{Field A} &= \text{D}_{16} \\ \textbf{Field B} &= 7_{16} \\ \text{Field C} &= 5_{16} \\ \text{Field D} &= \text{C}_{16} \end{aligned}$$