

TOY PROGRAMMING WORKSHEET

1. TOY has ____ registers, numbered R[0] through R[____]
2. One of these registers is special. Which is it? R[____] What makes it special?

3. TOY has ____ memory locations, addressed 00 through ____
4. One of these memory locations is special. Which is it? ____ What makes it special?

5. TOY has ____ op codes, numbered ____ through ____
6. TOY has one PC. What does "PC" stand for? _____
7. What does the PC do?

8. Use the TOY cheatsheet to fill in the following blanks:

MEM	CODE	PSEUDO-CODE	HUMAN-READABLE COMMENTS
10:	7101	R[1] ← 01	R[1] gets the constant 1
11:	4222	_____	Initialize R[2] to _____
12:	_____	R[3] ← 01	_____
13:	85FF	_____	Read N from StdIn (R[5])
14:	1423	R[4] ← R[2] + R[3]	Keep a running sum in R[4]
15:	1203	_____	Copy R[3] value into R[2]
16:	_____	_____	Copy R[4] value into R[3]
17:	_____	R[5] ← R[5] - R[1]	Subtract 1 from N (R[5])
18:	D514	_____	N > 0? Do another iteration.
19:	_____	_____	Send the sum in R[4] to StdOut
__:	0000	_____	When we get here, we're done!

9. List 6 TOY instructions, each having a different op code, that copy the value of R[B] into R[A].

_____, _____, _____, _____, _____, _____

10. List 7 TOY instructions, each having a different op code, that put 0000 in R[A].

_____, _____, _____, _____, _____, _____, _____

11. Write a TOY program that sets R[B] to the absolute value of R[A]. (Can be done in 4 or 5 lines.)

MEM	CODE	PSEUDO-CODE	HUMAN-READABLE COMMENTS
10:	----	-----	-----
11:	----	-----	-----
12:	----	-----	-----
13:	----	-----	-----
14:	0000	halt	All done!

12. Consider the following TOY program. What is the value of R[3] when it halts? _____

MEM	CODE	PSEUDO-CODE	HUMAN-READABLE COMMENTS
10:	7101	-----	-----
11:	7207	-----	-----
12:	7301	-----	-----
13:	1333	-----	-----
14:	2221	-----	-----
15:	D213	-----	-----
16:	0000	-----	-----