

NAME:

**Closed book. No calculators, no computer.
Write all answers on these sheets. Do not ask questions!**

question	1	2	3	4	5	6	7	total
points								
maximum	10	15	15	15	20	15	10	100

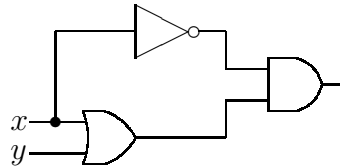
1. What is garbage collection?

/10

2. View B3 as a number in the hexadecimal system. What is B3 in the decimal system?

/15

3. Consider the circuit drawn below:



- (a) For $x = 1$ and $y = 1$, what is the outcome of this circuit?
Mark the results on the circuit drawing above.
- (b) What is the logical expression that represents this circuit?

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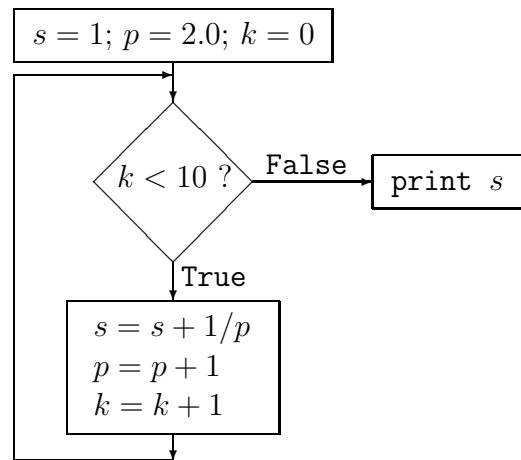
4. Let A be a given float representing an annual salary.

Suppose tax is computed along the following scale: for A less than \$5,000.00, the tax equals $0.5 \cdot A$, for A between \$5,000.00 and \$59,999.00, the tax equals $0.9 \cdot A$, and the tax is $0.17 \cdot A$ for A equal to \$60,000.00 and higher.

Write Python code that prints the tax with two places after the decimal point.

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5. Consider the flowchart:



(a) What *expression* does the algorithm in the flowchart compute?
(Do NOT evaluate the expression into one number.)

(b) Write Python code to implement the algorithm.

6. The 1-norm of a vector with coordinates (v_1, v_2, v_3) is $|v_1| + |v_2| + |v_3|$, where $|\cdot|$ is the absolute value function, available in Python as `math.fabs()`.

Write a Python *function* (call it `norm1`) which takes on input the coordinates of a vector and returns the 1-norm of the vector. Make sure the function works also for planar vectors, so the user can enter only two coordinates.

/15

7. Give the Python commands to generate a random 10-letter word.
Use `random.randint()` to uniformly generate letters.
The final result is a string of 10 characters.

/10
