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

<table>
<thead>
<tr>
<th>question</th>
<th>1</th>
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<tbody>
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<td>20</td>
<td>15</td>
<td>10</td>
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1. What is garbage collection?

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

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 $0.5 \times A$, for $A$ between $5,000.00$ and $59,999.00$, the tax equals $0.9 \times A$, and the tax is $0.17 \times A$ for $A$ equal to $60,000.00$ and higher.

   Write Python code that prints the tax with two places after the decimal point.
5. Consider the flowchart:

```
s = 1; p = 2.0; k = 0

k < 10 ?
   False: print s
   True:
       s = s + 1/p
       p = p + 1
       k = k + 1
```

(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 as 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.

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.