1. Describe different ways of representing negative numbers. Compare them; then choose the best for both implementing and calculating. Bring some reasons for your choice.

2. Compare Floating-Point and Fixed-Point systems for representing numbers.

3. What are the state of CF (Carry Flag), OF (Overflow Flag), SF (Sign Flag) and ZF (Zero Flag) after each of following actions:

\[
\begin{align*}
10101010 & \quad 10001111 & \quad 00110011 & \quad 10000000 & \quad 11111111 \\
+ \quad 00100100 & \quad + \quad 00000001 & \quad + \quad 01100100 & \quad + \quad 10000000 & \quad + \quad 11111111
\end{align*}
\]

4. **Floating-Point Numbers**: In a machine, we represent the floating-point number in this way:

<table>
<thead>
<tr>
<th>Bit No.</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>...</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>...</th>
<th>30</th>
<th>31</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meaning</td>
<td>S</td>
<td>exponent</td>
<td>significant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The value of the number can be evaluated by the formula below:

\[
(-1)^S \times (0.1\text{significand}) \times 2^{(\text{exponent}+\text{bias})}
\]
In this formula:

a) **1significant** means that we have a 1 at the left and then the bits of **significant** in a row after that.

b) **Bias** has a value of 2048.

c) In this method, we should use a string of 32 zeros as a representation of 0.

Now answer these questions:

1) What is the biggest non-zero and positive number that we can show in this method?

2) What is the smallest non-zero and positive number that we can show in this method?

3) What is the biggest non-zero and positive number that we can show in this method and if we add it by 1.0, the result is still 1.0?