Recall that in base ten, the digits to the right of the decimal point have the following values:

<table>
<thead>
<tr>
<th>Decimal Place</th>
<th>Name</th>
<th>Value - Fraction</th>
<th>Value - Exponent</th>
</tr>
</thead>
<tbody>
<tr>
<td>first</td>
<td>tenths</td>
<td>1/10</td>
<td>10^{-1}</td>
</tr>
<tr>
<td>second</td>
<td>hundredths</td>
<td>1/100</td>
<td>10^{-2}</td>
</tr>
<tr>
<td>third</td>
<td>thousandths</td>
<td>1/1000</td>
<td>10^{-3}</td>
</tr>
<tr>
<td>fourth</td>
<td>ten-thousandths</td>
<td>1/10000</td>
<td>10^{-4}</td>
</tr>
</tbody>
</table>

Using this information, answer the following questions.

1. What are the corresponding place values in the base two system?

2. What number is represented by each of the following?
   (a) $0.1_{\text{two}}$
   (b) $10.11_{\text{two}}$
   (c) $111.011_{\text{two}}$

3. Write each of the following base ten numbers in base two.
   (a) $10.5$
   (b) $0.75$
   (c) $2.25$
4. We can write numbers in base one-half if we use \( \frac{1}{2} \) as the base and the digits 0 and 1. For example, the numeral 101_{one-half} represents:

\[
1 \times \left( \frac{1}{2} \right)^2 + 0 \times \left( \frac{1}{2} \right)^1 + 1 \times \left( \frac{1}{2} \right)^0 = \frac{1}{4} + 0 + 1 = 1.25
\]

What number is represented by each of the following?
(a) 11_{one-half}

(b) 10.1_{one-half}

(c) 0.101_{one-half}

5. Write the first ten counting numbers base one-half.

6. How does the base one-half representation of a number relate to its base two representation?