Determining Adjacency

Same size blocks:

- two leaves are adjacent if their binary representations differ by binary 1 or 10 (decimal 1 or 2) in tesserel arithmetic
  
  - 01 and 05 are adjacent because 0001 and 0111 differ by binary 10, or decimal 2
  
  - 055 and 211 are adjacent because in tesserel arithmetic:

    \[ 00111 + 10 = 100101, \text{ or } 100101 - 10 = 00111 \]

Different size blocks:

Are 02 and 2 adjacent?

- convert 02 to binary = 0010
  
  \[
  \begin{align*}
    0010 + 1 &= 0011 \\
    0010 + 10 &= 1000 \\
    0010 - 1 &= \text{impossible} \\
    0010 - 10 &= 0000 \\
  \end{align*}
  \]

- truncating gives 00 and 10
- these are equal to 0 and 2 in base 4
- therefore, 02 and 2 are adjacent (also 02 and 0 are adjacent)

Are 033 and 2 adjacent?

- convert 033 to binary = 001111
  
  \[
  \begin{align*}
    00111 + 1 &= 01010 \\
    00111 + 10 &= 101001 \\
    00111 - 1 &= 0011 \\
    00111 - 10 &= 00101 \\
  \end{align*}
  \]

- truncating to two digits gives 01, 10 and 00
- these are equal to 1, 2 and 0 in base 4
- therefore, 033 and 2 are adjacent

Find leaves adjacent to 03 in the Sample Raster:

\[
\begin{array}{ccc}
\text{A} & \text{A} & \text{B} \\
\text{A} & \text{A} & \text{B} \\
\text{A} & \text{B} & \text{B} \\
\end{array}
\]

- find the codes of adjacent blocks of the same size, then work down the tree to find the appropriate leaf
  
  \[
  \begin{align*}
    \text{01} + 1 &= 0110 = \text{leaf 1} \\
    \text{01} + 10 &= 1000 = \text{leaf 2} \\
    \text{01} - 1 &= 0010 = \text{leaf 02} \\
    \text{01} - 10 &= 0001 = \text{leaf 01} \\
  \end{align*}
  \]