5.1 We have
\[ w_{N}^{j} = \exp \left( j \frac{2\pi N}{N} \right) = 1, \quad w_{N}^{Q} = \exp \left( j \frac{2\pi Q}{PQ} \right) = \exp \left( j \frac{2\pi}{P} \right) = w_{P}, \quad w_{N}^{P} = \exp \left( j \frac{2\pi P}{PQ} \right) = \exp \left( j \frac{2\pi}{Q} \right) = w_{Q}. \]

5.5 The order of the indices is: 0, 9, 18, 3, 12, 6, 15, 24, 1, 10, 19, 4, 13, 22, 7, 16, 25, 2, 11, 20, 5, 14, 23, 8, 17, 26.

5.6 Program 5.1 implements the bit-reversal procedure.

**Program 5.1 Bit reversal.**

```plaintext
function n = bitrev(r);
% Synopsis: n = bitrev(r).
% Performs bit reversal.
% Input:
% r: the number of bits.
% Output:
% n: the numbers [0..2^r-1] in a bit-reversed order.

if (r < 1),
    error('Input to BITREV must be greater than 0');
elseif (r == 1),
    n = [0,1];
else,
    temp = 2*bitrev(r-1);
    n = [temp, temp+1];
end
```