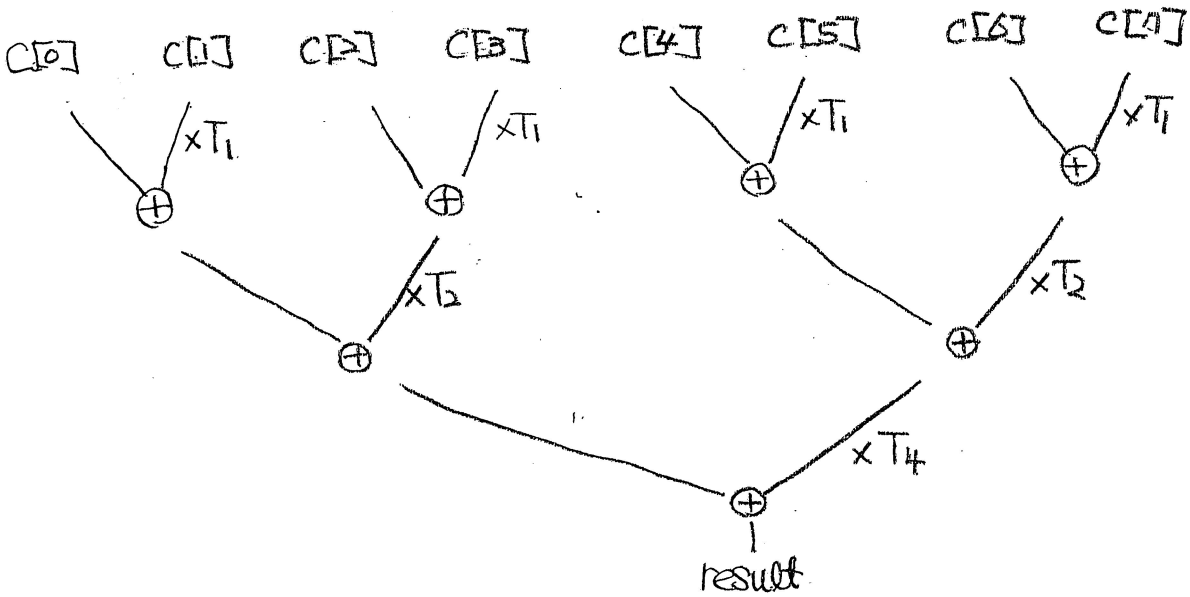
Conversion of polynomials

From $\sum_{i=0}^{N-1} c[i]\, T_i(x)$, [T_i : i^{th} Chebyshev polynomial].

To $\sum_{i=0}^{\frac{N}{2}-1} c[i]\, T_i(x) + T_{\frac{N}{2}}(x) \cdot \sum_{i=0}^{\frac{N}{2}-1} c[\tfrac{N}{2}+i] \cdot T_i(x)$

The conversion is recursively repeated to the binary-tree evaluation form, one of which is shown when N=8



```
void convert_poly_to_binarytreeform(double* c, int N){
    if(N==2) return;
    for(int i=0; i<N/2; i++){
        c[i] -= c[N/2+i];
        c[N/2+i] *= 2;
    }
    ________________________________
    convert_poly_to_binarytreeform( c, N/2);
            //                    (c+N/2, N/2);
}
```

power of 2

$T_{\frac{N}{2}+i} = 2T_{\frac{N}{2}} \cdot T_i - T_i$

$\therefore c[\tfrac{N}{2}+i]\, T_{\frac{N}{2}+i} = T_{\frac{N}{2}} \cdot [c[\tfrac{N}{2}+i] \cdot 2 \cdot T_i] - T_i \cdot c[\tfrac{N}{2}+i]$

recursive application