CFG constructions

1. Describe context-free grammars that generate each of the following languages.

    a) All strings in $\{0,1\}^*$ whose length is divisible by 5.

    b) $\{0^n1^{2n} \mid n \geq 0\}$.

    c) $\{0^n1^m \mid n \neq m - 1\}$.

    d) $\{0^i1^j2^j3^i \mid i, j \geq 0\}$.

    e) $\{0^n1^m \mid 2n \leq m \leq 3n\}$.

    f) $\{0^i1^j2^{i+j} \mid i, j \geq 0\}$.

    g) $\{0^n ww^R 0^n \mid n \geq 0, w \in \{0,1\}^*\}$.

    h) $\{0^n1^m \mid n \leq m + 3\}$.

    i) $\{0^n1^m \mid n \neq m\}$.

    j) All the strings over $\{0,1\}$ with more 0's than 1's.

    k) $\{x\#y \mid x, y \in \{0,1\}^* \text{ and } |x| = |y|\}$.

    l) $\{0^i1^j2^k \mid i = j \text{ or } j = k\}$.