1. (a) $9 \times 9 \times 8$ since the first digit must not be zero, the second anything except the first, and the third anything but the first two.

   (b) With O for odd and E for even, the four possible patterns and the number of 3-digit numbers having each pattern are

   $$EEO: \ 4 \times 4 \times 5 \quad EOO: \ 4 \times 5 \times 4 \quad OEO: \ 5 \times 5 \times 4 \quad OOO: \ 5 \times 4 \times 3.$$

   The answer is the sum of these. By the way, this is 40×8, somewhat less than half of (a), which is 81×8.

2. Use the formula on page 65 or, if you don't remember it, draw the relevant portion of the decision tree.

   (a) $\text{RANK}(7,3,1) = \binom{6}{3} + \binom{2}{2} + \binom{0}{1} = 21.$

   (b) We use the greedy algorithm method to compute UNRANK(17).
   - Since $\binom{6}{3} = 20$ and $\binom{5}{3} = 10$, $f(1) = 6$ and we have $17 - 10 = 7$ left to go.
   - Since $\binom{5}{2} = 10$ and $\binom{4}{2} = 6$, $f(2) = 5$ and we have $7 - 6 = 1$ left to go.
   - Since $\binom{1}{1} = 1$, $f(3) = 2$.

   Thus the function is 6,5,2 in one-line form.

5. Either
   (0) n does not appear AND the remaining $n-1$ elements form a k-list, giving the term $1 \times L(n-1,k)$, OR
   (1) n appears in one of the k positions AND the remaining $n-1$ elements form a $(k-1)$-list in the remaining $k-1$ positions, giving $k \times L(n-1,k-1)$, OR
   (2) n appears in two of the k positions AND the remaining $n-1$ elements form a $(k-2)$-list in the remaining $k-1$ positions, giving $\binom{k}{2} \times L(n-1,k-2)$.

   In other words, $a = 1$, $b = k$ and $c = \binom{k}{2}$.