Answer Key

1. a. $r = 3$
   b. $n - r = 2$
   c. $n - 3 = 2 \qquad n = 2 + 3 \qquad n = 5$
   d. $C(n, r) = C(5, 3) = 10$

2. Length 5 means 1x, 3x, or 5x ones.
   one 1, four 0: $r = 1$, $n - r = 4$, $n - 1 = 4, n = 5$, $C(5, 1) = 5$
   three 1, two 0: $r = 3$, $n - r = 2$, $n - 3 = 2, n = 5$, $C(5, 3) = 10$
   five 1, zero 0: $r = 5$, $n - r = 0$, $n - 5 = 0, n = 5$, $C(5, 5) = 1$
   $5 + 10 + 1 = 16$

3. a. 0100010000
   b. 0000100001
   c. 0000000011

4. a. $n = 5$
   b. $r = 12$
   c. 4 separators
   d. 12 donuts + 4 separators = 16
   e. $r + n - 1 = 12 + 5 - 1 = 16$
   f. $C(16, 12)$ or $C(16, 4)$.
   g. $C(16, 12) = 1,820$

5. 20 pieces of fruit, 2 separators: $C(22, 20)$.
   $C(22, 20) = 231$