1.2.8 \( \lim_{k \to \infty} C_k = \{x : 0 < x < 3\} \). Note: neither the number 0 nor the number 3 is in any of the sets \( C_k, k = 1, 2, 3, \ldots \). The point at the origin \((0, 0)\) and the circle with center \((0, 0)\) and radius 2 is excluded from all the sets \( C_k, k = 1, 2, \ldots \). Hence, \( \lim_{k \to \infty} C_k = \{(x, y) : 0 < x^2 + y^2 < 4\} \).

1.3.23 Choose an integer \( n_0 > \max\{a^{-1}, (1-a)^{-1}\} \). Then \( \{a\} = \bigcap_{n=n_0}^{\infty} (a - \frac{1}{n}, a + \frac{1}{n}) \). Hence by (1.3.10),

\[
P(\{a\}) = \lim_{n \to \infty} P\left[\left( a - \frac{1}{n}, a + \frac{1}{n} \right) \right] = \frac{2}{n} = 0.
\]

1.4.5

\[
\frac{\left[ \binom{4}{3} \binom{48}{10} + \binom{4}{4} \binom{48}{9} \right] / \binom{52}{13}}{\left[ \binom{4}{2} \binom{48}{11} + \binom{4}{3} \binom{48}{10} + \binom{4}{4} \binom{48}{9} \right] / \binom{52}{13}}.
\]