

$$1. \frac{\binom{17}{3,3,3,4,4}}{\binom{20}{4,4,4,4,4}} = \frac{4^3 \cdot 5!}{2 \cdot 20 \cdot 19 \cdot 18} = 56.14\%$$

$$2. 6 \cdot \frac{5 \cdot \binom{7}{3,4} + \binom{5}{2} \cdot \binom{7}{3,2,2} + 5 \cdot \binom{4}{2} \cdot \binom{7}{3,2,1,1} + \binom{5}{4} \cdot \binom{7}{3,1,1,1,1}}{6^7} = \binom{7}{3} \cdot \frac{5 + \binom{5}{2} \cdot \binom{4}{2} + 5 \cdot \binom{4}{2} \cdot \binom{4}{2} \cdot 2 + \binom{5}{4} \cdot 4!}{6^6} = 40.88\%$$

$$3. \binom{157}{119,15,12,11} (-3)^{15} 4^{12} (-2)^{11} = \binom{157}{38} \cdot \binom{38}{15} \cdot \binom{23}{12} \cdot (-3)^{15} \cdot 4^{12} \cdot (-2)^{11} = 4.149 \times 10^{70}$$

$$\binom{157+3}{3} = 669,920$$

4.

$$(A \cup C) \cap (B \cup \overline{C \cup D}) = (A \cup C) \cap [B \cup (\overline{C} \cap \overline{D})] = (A \cap B) \cup (A \cap \overline{C} \cap \overline{D}) \cup (C \cap B)$$

5.

$$P[(A \cap \overline{B}) \cup (B \cap \overline{A \cup C})] =$$

$$P(A \cap \overline{B}) + P(B \cap \overline{A} \cap \overline{C}) - P(\emptyset) =$$

$$P(A) - P(A \cap B) + P(B \cap \overline{A}) - P(B \cap \overline{A} \cap C) =$$

$$P(A) - P(A \cap B) + P(B) - P(B \cap A) - P(B \cap C) + P(B \cap A \cap C) =$$

$$0.31 - 0.11 + 0.33 - 0.11 - 0.12 + .05 = 35\%$$

$$6. \frac{2 \times 3 \times 8 \times 2 \times 9!}{12!} = 7.273\%$$

$$7. \frac{\binom{13}{1} \cdot \binom{13}{2} \cdot \binom{26}{2}}{\binom{52}{5}} = 12.68\%$$

8. Sample space

a	a	a	a	a	a	b	b	b	b	b	b	c	c	c	c	c	c	d	d	d	d	d	
b	b	c	c	d	d	a	a	c	c	d	d	a	a	b	b	d	d	a	a	b	b	c	c
c	d	b	d	b	c	c	d	a	d	a	c	b	d	a	d	a	b	b	c	a	c	a	b
d	c	d	b	c	b	d	c	d	a	c	a	d	b	d	a	b	a	c	b	c	a	b	a
4	2	2	1	1	2	2	0	1	0	0	1	1	0	2	1	0	0	0	1	1	2	0	0

$\frac{9}{24}, \frac{8}{24}, \frac{6}{24}, \frac{0}{24}$, and $\frac{1}{24}$ respectively.