

第一题

课后习题 1

1. $\overline{A_1} \overline{A_2} \overline{A_3}$
2. $\overline{A_1 \cup A_2 \cup A_3}$
3. $\overline{A_1} \overline{A_2} \cup \overline{A_2} \overline{A_3} \cup \overline{A_1} \overline{A_3}$
4. $\overline{A_1 A_2 A_3}$
5. $A_1 \cup A_2 \cup A_3$
6. $A_1 A_2 \cup A_2 A_3 \cup A_1 A_3$

课后习题 4

令 $A = \{x^2 + y^2 \leq 19 | x, y \in [6]\}$, $\Omega = \{x, y | x, y \in [6]\}$,

列出 $A = (1, 1)(1, 2)(1, 3)(1, 4)(2, 1)(2, 2)(2, 3)(3, 1)(3, 2)(3, 3)(4, 1)$

得到 $|A| = 11$, $P(A) = \frac{|A|}{|\Omega|} = \frac{11}{36}$ 。

课后习题 6

$$10 * \frac{1}{50} * \frac{1}{49} * \frac{1}{48} * 3! = \frac{10}{C_{50}^3}$$

课后习题 12

$$A = \{(p, q) | p^2 - 4 * q \geq 0, |p| \leq 1, |q| \leq 1\}$$

$$\Omega = \{(p, q) | |p| \leq 1, |q| \leq 1\},$$

$$S_{\Omega} = 2 * 2 = 4$$

$$S_A = 1 * 2 + \int_{-1}^1 \frac{q^2}{4} dq = 2 + \frac{1}{6} = \frac{13}{6}$$

$$P(A) = \frac{|A|}{|\Omega|} = \frac{S_A}{S_{\Omega}} = \frac{13}{24}$$

课后习题 13

设三角形的两条边为 x, y , 则第三条边长度为 $2a - x - y$,

$$A = \{(x, y) | x + y \leq 2a - x - y, x - y \leq 2a - x - y, y - x \leq 2a - x - y\} = \{(x, y) | x +$$

$$\Omega = \{(x, y) | x + y \leq 2a\}$$

$$P(A) = \frac{|A|}{|\Omega|} = \frac{S_A}{S_\Omega} = \frac{1}{4}$$

第二题

```
#include <iostream>
#include <cstdlib>
#include <cmath>
using namespace std;
#define TIMES 100000000
int main() {
    int n = 0;
    double x, y; // x from -1.5 to 1.5, y from -1 to 2
    for (int i = 0; i < TIMES; i++) {
        x = ((double)rand() / RAND_MAX) * 1.5;
        y = ((double)rand() / RAND_MAX) * 3 - 1;
        if (pow(x, 2) + pow(y - pow(x, 2.0 / 3), 2.0) <= 1.0)
            n++;
    }
    cout << ((double)n / TIMES) * 9 << endl;
    return 0;
}
```

最后得出结果为 $3.1411 = \pi$

第三题

假定其前 $\log_2^n + k$ 个硬币连续正面向上，之后的随意，则有 $P(A) \leq \frac{2^{n-\log_2^n-k}}{2^n} = 2^{-\log_2^n-k} \leq 2^{-k}$

第四题

$$1. P(X > Y) = P(X = 5) * P(Y = 3 | Y = 4) = \frac{4}{6} * \frac{5}{6} = \frac{5}{9}$$

$$P(Y > Z) = P(Y = 3) * P(Z = 2) + P(Y = 4) * P(Z = 2 | Z = 3) = \frac{2}{6} * \frac{2}{6} + \frac{3}{6} * \frac{4}{6}$$

$$P(Z > X) = P(Z = 2 | Z = 3 | Z = 6) * P(X = 1) + P(Z = 6) * P(X = 5) = \frac{6}{6} * \frac{2}{6}$$

2.

A	1	4	4	4	4	4
B	3	3	3	3	3	6
C	2	2	2	5	5	5

$$P(A > B) = \frac{5}{6} * \frac{5}{6} = \frac{25}{36} > \frac{5}{9}$$

$$P(B > C) = \frac{5}{6} * \frac{3}{6} + \frac{1}{6} * \frac{6}{6} = \frac{21}{36} > \frac{5}{9}$$

$$P(C > A) = \frac{3}{6} * \frac{1}{6} + \frac{3}{6} * \frac{6}{6} = \frac{21}{36} > \frac{5}{9}$$