Header:

(1) Monte Carlo Methods (J.V. Neyman | 1946).

footer:

Find the S.E. of f's and the repetition number.

X	0	1	2	3	4	f
X_1						+1
X_2						0
⋮						
X_n						

(2) Program.

(3) Header: Monte-Carlo methods

footer: }

(4) Header:

```
p = (float)(sum)/n;
printf(" The prob is %lf \n", p);
}
```

(5) Header:

Monte carlo Integration & Importance sampling

footer:

$$P(X>c) = \int_c^\infty \phi(x)\,dx = \int_{-\infty}^{\infty} I(X>c)\,\phi(x)\,dx$$

$$= \int_{-\infty}^{\infty} \frac{I(x>c)}{\phi(x-\mu)} \cdot \phi(x-\mu)\,dx.$$

(6) Header:

$$= E\left\{ I(X>c)\,\frac{\phi(x)}{\phi(x-\mu)} \cdot \middle|\, X \sim N(\mu,1) \right\}$$

$$= E\left\{ I(X>c) \cdot e^{-(\mu^2/2 + \mu x)} \,\middle|\, X \sim N(\mu,1) \right\}.$$

footer:

$$\int_1^\infty \frac{\log x}{x^3}\,dx = 1/2 \int_1^\infty \log x \,\frac{2}{x^3}\,dx = \frac{1}{2} E(\log x \mid X \sim \text{Pareto}())$$

$$\longrightarrow \frac{1}{2} \quad \frac{1}{n}\sum_{i=1}^{n} \log x_i \mid X \sim \text{Par}(2,n).$$

(7) Header:

Linear Congruential method

footer: Max. period $= 2^{m-2}$, $a = 3 \pmod 8$ or $a = 5 \pmod 8$.

Inital seed is odd.

(8) Header: $\therefore$ $a = 8N+3$ or $8N+5$ for a full period.

footer: $Q > \chi^2_{0.05,\,k-1}$ $\quad H_0$: the sample is random.