1. $P(A) = \dfrac{\text{Số trường hợp thuận lợi cho } A}{\text{Số trường hợp có thể của phép thử}}$

2. $P(A) = \dfrac{m(A)}{m(\Omega)}$

9. $P(AB) \overset{?}{=} P(A) \cdot P(B)$

10. $P(A) = \sum\limits_{i=1}^{n} P(H_i) \cdot P(A \mid H_i)$

3. $P(A+B) = P(A) + P(B) - P(AB)$, $\quad P(A+B+C) = P(A) + P(B) + P(C) - P(AB) - P(AC) - P(BC) + P(ABC)$

$$P\left(\sum_{i=1}^{n} A_i\right) = \sum_i P(A_i) - \sum_{i<j} P(A_iA_j) + \sum_{i<j<k} P(A_iA_jA_k) - \ldots + (-1)^{k-1} \sum_{i_1<i_2<\ldots<i_k} P(A_{i_1}A_{i_2}\ldots A_{i_k}) + \ldots + (-1)^{n-1} P(A_1A_2\ldots A_n)$$

4. $P(A_1 + A_2 + \ldots + A_n) \overset{?}{=} P(A_1) + P(A_2) + \ldots + P(A_n)$

5. $P(A) + P(\overline{A}) = 1$

6. $P(A \mid B) = \dfrac{P(AB)}{P(B)}$

7. $P(A \mid B) = \dfrac{\text{Số trường hợp thuận lợi cho } A \text{ khi } B \text{ đã xảy ra}}{\text{Số trường hợp có thể của phép thử (tạo ra } A\text{) khi } B \text{ đã xảy ra}}$

8. $P(A_1A_2\ldots A_n) = P(A_1) \cdot P(A_2 \mid A_1) \cdot P(A_3 \mid A_1A_2) \cdots P(A_n \mid A_1A_2\ldots A_{n-1})$

11. $P(H_i \mid A) = \dfrac{P(H_i) \cdot P(A \mid H_i)}{P(A)}$

12. $P(B_k) = C_n^k p^k (1-p)^{n-k}$

---

13. $P(X = x_i) = p_i \ \forall i$

14. $\sum\limits_i p_i = 1$

15. $P(X \in A) = \sum\limits_{x_i \in A} p_i$

16. $\int_{-\infty}^{\infty} f(x)\,dx = 1$

17. $P(a \underset{\le}{<} X \underset{\le}{<} b) = \int_a^b f(x)\,dx$

18. $F(x) = P(X < x) = \begin{cases} \sum\limits_{x_i < x} p_i \\ \int_{-\infty}^{x} f(t)\,dt \end{cases}$

19. $F'(x) = f(x)$

20. $P(a \le X < b) = F(b) - F(a)$

21. $Y = \varphi(X)$: $\mathrm{Im}\,Y = \varphi(\mathrm{Im}\,X) = \{y = \varphi(x_i) \mid x_i \in \mathrm{Im}X\}$

$P(Y = y) = P[\varphi(X) = y] = \sum\limits_{\varphi(x_i)=y} p_i$

22, 23. $Y = \varphi(X)$: $\varphi(x) < y \Leftrightarrow a(y) < x < b(y)$

$g(y) = b'(y) f[b(y)] - a'(y) f[a(y)]$

24. $EX = \begin{cases} \sum\limits_i x_i p_i \\ \int_{-\infty}^{\infty} x f(x)\,dx \end{cases}$: $E(X+Y) = EX + EY$, $E(kX) = k \cdot EX$

25. $E[\varphi(X)] = \begin{cases} \sum\limits_i \varphi(x_i) p_i \\ \int_{-\infty}^{\infty} \varphi(x) f(x)\,dx \end{cases}$

26. $E(X^2) = \begin{cases} \sum\limits_i x_i^2 p_i \\ \int_{-\infty}^{\infty} x^2 f(x)\,dx \end{cases}$

27. $DX = E(X^2) - (EX)^2$: $D(kX) = k^2 DX$, $D(X+Y) \overset{?}{=} DX + DY$

28. $\sigma(X) = \sqrt{DX}$

29. $X \sim B(n,p)$: $P(X = k) = C_n^k p^k (1-p)^{n-k}$, $k = \overline{0,n}$

$EX = np$, $DX = np(1-p)$

30. $X \sim P_\lambda$: $P(X = k) = e^{-\lambda}\dfrac{\lambda^k}{k!}$, $k = 0, 1, 2, \ldots$; $EX = \lambda$, $DX = \lambda$

31. $X \sim U(a,b)$: $f(x) = \begin{cases} \dfrac{1}{b-a}, & x \in [a,b] \\ 0, & x \notin [a,b] \end{cases}$

$EX = \dfrac{a+b}{2}$, $DX = \dfrac{(b-a)^2}{12}$

32. $X \sim \varepsilon_\lambda$: $f(x) = \begin{cases} \lambda e^{-\lambda x}, & x > 0 \\ 0, & x \le 0 \end{cases}$. $EX = \dfrac{1}{\lambda}$, $DX = \dfrac{1}{\lambda^2}$

33, 34. $X \sim N(\mu, \sigma^2)$: $f(x) = \dfrac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$. $EX = \mu$, $DX = \sigma^2$

$P(a < X < b) = \Phi\left(\dfrac{b-\mu}{\sigma}\right) - \Phi\left(\dfrac{a-\mu}{\sigma}\right)$

35. $P(X = x_i, Y = y_j) = p_{ij} \ \forall i, j$

36. $\sum\limits_{i,j} p_{ij} = 1$

37. $P[(X,Y) \in A] = \sum\limits_{(x_i,y_j) \in A} p_{ij}$

38. $\iint\limits_{\mathbb{R}^2} f(x,y)\,dxdy = 1$

39, 40. $P[(X,Y) \in A] = \iint\limits_A f(x,y)\,dxdy \overset{?}{=} \int_a^b dx \int_{c(x)}^{d(x)} f(x,y)\,dy$

41. $F(x,y) = P(X < x, Y < y) = \begin{cases} \sum\limits_{x_i < x, y_j < y} p_{ij} \\ \iint\limits_{u<x, v<y} f(u,v)\,dudv \end{cases}$

42. $\dfrac{\partial^2}{\partial x \partial y} F(x,y) = f(x,y)$

43. $p_{i*} = P(X = x_i) = \sum\limits_j p_{ij}$, $\quad p_{*j} = P(Y = y_j) = \sum\limits_i p_{ij}$

44. $X : f_1(x) = \int_{-\infty}^{\infty} f(x,y)\,dy$, $\quad Y : f_2(y) = \int_{-\infty}^{\infty} f(x,y)\,dx$

45. $F(x,y) \overset{?}{=} F_1(x) \cdot F_2(y) \ \forall x, y$

46. $p_{ij} = p_{i*} \cdot p_{*j} \ \forall i, j$

47. $f(x,y) = f_1(x) \cdot f_2(y) \ \forall x, y$

48, 49. $Z = (X \mid Y = y_j)$: $P(Z = x_i) = P(X = x_i \mid Y = y_j) = \dfrac{p_{ij}}{p_{*j}}$

$\varphi(x \mid y) = \dfrac{f(x,y)}{f_2(y)} \ \forall x$

50, 51. $Z = X + Y$: $P(Z = z) = P(X + Y = z) = \sum\limits_{x_i + y_j = z} p_{ij}$

$g(z) = \int_{-\infty}^{\infty} f(x, z-x)\,dx$

52. $E[\varphi(X,Y)] = \begin{cases} \sum\limits_{i,j} \varphi(x_i, y_j) \cdot p_{ij} \\ \iint\limits_{\mathbb{R}^2} \varphi(x,y) \cdot f(x,y)\,dxdy \end{cases}$

53. $E(XY) = \begin{cases} \sum\limits_{i,j} x_i y_j p_{ij} \\ \iint\limits_{\mathbb{R}^2} xy f(x,y)\,dxdy \end{cases}$

54. $\mathrm{cov}(X,Y) = E(XY) - EX \cdot EY$

55. $\rho_{XY} = \dfrac{\mathrm{cov}(X,Y)}{\sigma(X) \cdot \sigma(Y)} = \dfrac{E(XY) - EX \cdot EY}{\sqrt{DX}\sqrt{DY}}$

? $Z = [\varphi(X,Y) \mid (X,Y) \in A]$

*

---

56. $P(|X - EX| \geqslant \varepsilon) \leqslant \dfrac{DX}{\varepsilon^2}$

57, 58. $\overline{X} \xrightarrow{P} a$, $\quad \dfrac{m}{n} \xrightarrow{P} p$

59. $\lim\limits_{n \to \infty} P\left(\dfrac{\overline{X} - a}{\sigma}\sqrt{n} < x\right) = \Phi(x)$

60. $P(k_1 \leqslant m \leqslant k_2) \approx \Phi\left[\dfrac{k_2 - np}{\sqrt{np(1-p)}}\right] - \Phi\left[\dfrac{k_1 - np}{\sqrt{np(1-p)}}\right]$

61. $\overline{X} = \dfrac{1}{n}\sum\limits_{i=1}^{n} X_i$

62. $S^2 = \dfrac{1}{n}\sum\limits_{i=1}^{n}\left(X_i - \overline{X}\right)^2 = \left(\dfrac{1}{n}\sum\limits_{i=1}^{n} X_i^2\right) - \overline{X}^2$

63. $S'^2 = \dfrac{1}{n-1}\sum\limits_{i=1}^{n}\left(X_i - \overline{X}\right)^2 = \dfrac{n}{n-1}S^2$

64. $\overline{x} = \dfrac{1}{n}\sum\limits_{i=1}^{n} x_i$

65. $s^2 = \left(\dfrac{1}{n}\sum\limits_{i=1}^{n} x_i^2\right) - \overline{x}^2$

66. $s'^2 = \dfrac{n}{n-1}s^2$

67. $n \overset{?}{=} \sum\limits_{i=1}^{k} n_i$

68. $\overline{x} = \dfrac{1}{n}\sum\limits_{i=1}^{k} n_i x_i$

69. $s^2 = \left(\dfrac{1}{n}\sum\limits_{i=1}^{n} n_i x_i^2\right) - \overline{x}^2$

70. $U \sim \chi_k^2$: $P\left[U > \chi^2(p,k)\right] = p$

71. $T \sim t_k$: $P\left(|T| > t_p^k\right) = p$

72.

Tham số	Kiểu ước lượng			Ghi chú
	ƯLKC	Khoảng tin cậy với độ tin cậy γ		$\gamma < 1, \approx 1, X \sim N$
EX	$\overline{X}$	$DX = \sigma^2$ đã biết	$\left(\overline{X} - z_0\dfrac{\sigma}{\sqrt{n}}, \overline{X} + z_0\dfrac{\sigma}{\sqrt{n}}\right)$	$\Phi(z_0) = \dfrac{1+\gamma}{2}$ $(*)$
		DX chưa biết	$\left(\overline{X} - t_0\dfrac{S}{\sqrt{n-1}}, \overline{X} + t_0\dfrac{S}{\sqrt{n-1}}\right)$	$t_0 = t_{1-\gamma}^{n-1}$
DX	S'^2	$\left(\dfrac{nS^2}{\chi^2\left(\frac{1-\gamma}{2}, n-1\right)}, \dfrac{nS^2}{\chi^2\left(\frac{1+\gamma}{2}, n-1\right)}\right)$		
$p = P(A)$	$p^* = \dfrac{m}{n}$	$\left(p^* - z_0\sqrt{\dfrac{p^*(1-p^*)}{n}}, p^* + z_0\sqrt{\dfrac{p^*(1-p^*)}{n}}\right)$		Như $(*)$ và $n \gg 1$

73.

H_0	H_1	Dấu hiệu	Tiêu chuẩn	ĐK bác bỏ H	Ghi chú
$EX = a_0$	$EX \neq a_0$	$DX = \sigma^2$ đã biết	$z_{qs} = \dfrac{\overline{x} - a_0}{\sigma}\sqrt{n}\,(*)$	$\lvert z_{qs}\rvert > z_0$	$\Phi(z_0) = 1 - \dfrac{\alpha}{2}$
	$EX > a_0$			$z_{qs} > z_0$	$\Phi(z_0) = 1 - \alpha$
	$EX < a_0$			$z_{qs} < -z_0$	
như trên		DX chưa biết	$t_{qs} = \dfrac{\overline{x} - a_0}{s}\sqrt{n-1}\,(**)$	$\lvert t_{qs}\rvert > t_0$	$t_0 = t_{\alpha}^{n-1}$
				$t_{qs} > t_0$	$t_0 = t_{2\alpha}^{n-1}$
				$t_{qs} < -t_0$	
$p = p_0$	$p \neq p_0$	$n \gg 1$	$z_{qs} = \dfrac{\frac{m}{n} - p_0}{\sqrt{p_0(1-p_0)}}\sqrt{n}$	như $(*)$	
	$p > p_0$				
	$p < p_0$				
$EX = EY$	$EX \neq EY$	DX, DY đã biết	$z_{qs} = \dfrac{\overline{x} - \overline{y}}{\sqrt{\frac{DX}{n} + \frac{DY}{m}}}$	như $(*)$	
	$EX > EY$				
	$EX < EY$				
như trên		$DX = DY$ chưa biết	$t_{qs} = (1)$	như $(**)$, thay $n-1$ bởi $n+m-2$	
$p_1 = p_2$	$p_1 \neq p_2$	$n_1, n_2 \gg 1$	$z_{qs} = (2)$	như $(*)$	
	$p_1 > p_2$				
	$p_1 < p_2$				

$$(1) = \frac{\overline{x} - \overline{y}}{\sqrt{ns_X^2 + ms_Y^2}}\sqrt{\frac{nm(n+m-2)}{n+m}},\ (2) = \left(\frac{m_1}{n_1} - \frac{m_2}{n_2}\right)\sqrt{\frac{n_1 n_2 (n_1+n_2)}{(m_1+m_2)(n_1+n_2-m_1-m_2)}}.$$

74. $H_0 : P(A_i) = p_{i0}\ \forall i = \overline{1,h}$: **(a)** $e_i \overset{?}{=} np_{i0}$, **(b)** $\chi^2 = \sum\limits_{i=1}^{h}\dfrac{(n_i - e_i)^2}{e_i}$, **(c)** $\chi^2 \overset{?}{>} \chi^2(\alpha, h-1)$

75. $H_0 : X \sim F(x)$: **(a)** $\mathrm{Im}X = S_1 \cup S_2 \cup \ldots \cup S_h$, **(b)** $p_{i0} = P\left(X \in S_i \mid H\right) = \begin{cases}\sum\limits_{x_k \in S_i} p_k \\ \int\limits_{S_i} f(x)\,dx\end{cases}$, **(74)**

76. $H_0 : X \sim F\left(x, \theta_1, \theta_2, \ldots, \theta_r\right) \Leftrightarrow H^* : X \sim F\left(x, \theta_1^*, \theta_2^*, \ldots, \theta_r^*\right)$, $\chi^2 \overset{?}{>} \chi^2(\alpha, h-r-1)$:

$X \sim ?$	θ	θ^*
$B(n,p)$	p	p^*
P_λ	λ	$\overline{X}$
$U(a,b)$	a, b	$\overline{X} - S\sqrt{3},\ \overline{X} + S\sqrt{3}$
ε_λ	λ	$1/\overline{X}$
$N\left(\mu, \sigma^2\right)$	μ, σ^2	$\overline{X}, S^2$

77. $H_0 : X, Y$ độc lập: **(a)** $\mathrm{Im}X = S_1 \cup \ldots \cup S_h$, $\mathrm{Im}Y = T_1 \cup \ldots \cup T_k$; **(b)** $n_{i*} = \sum\limits_j n_{ij}$, $n_{*j} = \sum\limits_i n_{ij}$; **(c)** $e_{ij} = \dfrac{n_{i*} \times n_{*j}}{n}$; **(d)** $\chi^2 = \sum\limits_{i,j}\dfrac{\left(n_{ij} - e_{ij}\right)^2}{e_{ij}}$; **(e)** $\chi^2 \overset{?}{>} \chi^2\left[\alpha, (h-1)(k-1)\right]$

78. $r = \dfrac{\overline{XY} - \overline{X}\cdot\overline{Y}}{S_X S_Y}$

79. $Z = E\left(Y \mid X\right)$: $X = x_i \Rightarrow Z = E\left(Y \mid X = x_i\right) = \dfrac{1}{p_{i*}}\sum y_j p_{ij}$

$$X = x \Rightarrow Z = \frac{1}{f_1(x)}\int_{-\infty}^{\infty} y f(x,y)\,dy$$

80. $E\left\{[Y - aX - b]^2\right\} \to \min\limits_{a,b}$: $a = \rho\sqrt{\dfrac{DY}{DX}}$, $b = EY - a\,EX$

81. $\dfrac{1}{n}\sum\limits_{i=1}^{n}(Y_i - aX_i - b)^2 \to \min\limits_{a,b}$: $a = r\dfrac{S_Y}{S_X}$, $b = \overline{Y} - a\overline{X}$