Formulae

Presumed knowledge

Area of a parallelogram	$A = (b \times h)$, where b is the base, h is the height
Area of a triangle	$A = \frac{1}{2}(b \times h)$, where b is the base, h is the height
Area of a trapezium	$A = \frac{1}{2}(a + b)h$, where a and b are the parallel sides, h is the height
Area of a circle	$A = \pi r^2$, where r is the radius
Circumference of a circle	$C = 2\pi r$, where r is the radius
Volume of a pyramid	$V = \frac{1}{3}$(area of base $\times$ vertical height)
Volume of a cuboid	$V = l \times w \times h$, where l is the length, w is the width, h is the height
Volume of a cylinder	$V = \pi r^2 h$, where r is the radius, h is the height
Area of the curved surface of a cylinder	$A = 2\pi rh$, where r is the radius, h is the height
Volume of a sphere	$V = \frac{4}{3}\pi r^3$, where r is the radius
Volume of a cone	$V = \frac{1}{3}\pi r^2 h$, where r is the radius, h is the height
Distance between two points (x_1, y_1) and (x_2, y_2)	$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$
Coordinates of the midpoint of a line segment with endpoints (x_1, y_1) and (x_2, y_2)	$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

Topic 1—Core: Algebra

1.1	The n^{th} term of an arithmetic sequence	$u_n = u_1 + (n-1)d$
	The sum of n terms of an arithmetic sequence	$S_n = \frac{n}{2}(2u_1 + (n-1)d) = \frac{n}{2}(u_1 + u_n)$
	The n^{th} term of a geometric sequence	$u_n = u_1 r^{n-1}$
	The sum of n terms of a finite geometric sequence	$S_n = \frac{u_1(r^n - 1)}{r-1} = \frac{u_1(1-r^n)}{1-r}$, $r \neq 1$
	The sum of an infinite geometric sequence	$S = \frac{u_1}{1-r}$, $\lvert r \rvert < 1$
1.2	Exponents and logarithms	$a^x = b \Leftrightarrow x = \log_a b$ $a^x = \mathrm{e}^{x \ln a}$ $\log_a a^x = x = a^{\log_a x}$ $\log_b a = \frac{\log_c a}{\log_c b}$
1.3	Combinations	$\binom{n}{r} = \frac{n!}{r!(n-r)!}$
	Binomial theorem	$(a+b)^n = a^n + \binom{n}{1}a^{n-1}b + \ldots + \binom{n}{r}a^{n-r}b^r + \ldots + b^n$
1.5	Complex numbers	$z = a + \mathrm{i}b = r(\cos\theta + \mathrm{i}\sin\theta) = r\mathrm{e}^{i\theta} = r\,\mathrm{cis}\,\theta$
1.7	De Moivre's theorem	$[r(\cos\theta + \mathrm{i}\sin\theta)]^n = r^n(\cos n\theta + \mathrm{i}\sin n\theta) = r^n\mathrm{e}^{in\theta} = r^n\,\mathrm{cis}\,n\theta$

Topic 2—Core: Functions and equations

2.5	Axis of symmetry of the graph of a quadratic function	$f(x) = ax^2 + bx + c \Rightarrow$ axis of symmetry $x = -\frac{b}{2a}$
2.6	Solution of a quadratic equation	$ax^2 + bx + c = 0 \Rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, $a \neq 0$
	Discriminant	$\Delta = b^2 - 4ac$

Topic 3—Core: Circular functions and trigonometry

3.1	Length of an arc	$l = \theta r$, where θ is the angle measured in radians, r is the radius
	Area of a sector	$A = \frac{1}{2}\theta r^2$, where θ is the angle measured in radians, r is the radius
3.2	Identities	$\tan\theta = \frac{\sin\theta}{\cos\theta}$
	Pythagorean identities	$\cos^2\theta + \sin^2\theta = 1$ $1 + \tan^2\theta = \sec^2\theta$ $1 + \cot^2\theta = \csc^2\theta$
3.3	Compound angle identities	$\sin(A \pm B) = \sin A\cos B \pm \cos A\sin B$ $\cos(A \pm B) = \cos A\cos B \mp \sin A\sin B$ $\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A\tan B}$
	Double angle identities	$\sin 2\theta = 2\sin\theta\cos\theta$ $\cos 2\theta = \cos^2\theta - \sin^2\theta = 2\cos^2\theta - 1 = 1 - 2\sin^2\theta$ $\tan 2\theta = \frac{2\tan\theta}{1 - \tan^2\theta}$
3.6	Cosine rule	$c^2 = a^2 + b^2 - 2ab\cos C$; $\cos C = \frac{a^2 + b^2 - c^2}{2ab}$
	Sine rule	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
	Area of a triangle	$A = \frac{1}{2}ab\sin C$, where a and b are adjacent sides, C is the included angle

Topic 4—Core: Matrices

4.3	Determinant of a 2×2 matrix	$\boldsymbol{A} = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \Rightarrow \det \boldsymbol{A} = ad - bc$
	Inverse of a 2×2 matrix	$\boldsymbol{A} = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \Rightarrow \boldsymbol{A}^{-1} = \frac{1}{ad - bc}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$, $ad \neq bc$
	Determinant of a 3×3 matrix	$\boldsymbol{A} = \begin{pmatrix} a & b & c \\ d & e & f \\ g & h & k \end{pmatrix} \Rightarrow \det \boldsymbol{A} = a\begin{vmatrix} e & f \\ h & k \end{vmatrix} - b\begin{vmatrix} d & f \\ g & k \end{vmatrix} + c\begin{vmatrix} d & e \\ g & h \end{vmatrix}$

Topic 5—Core: Vectors

5.1	Magnitude of a vector	$\lvert \boldsymbol{v} \rvert = \sqrt{v_1^{\,2} + v_2^{\,2} + v_3^{\,2}}$, where $\boldsymbol{v} = \begin{pmatrix} v_1 \\ v_2 \\ v_3 \end{pmatrix}$
	Distance between two points (x_1, y_1, z_1) and (x_2, y_2, z_2)	$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$
	Coordinates of the midpoint of a line segment with endpoints (x_1, y_1, z_1), (x_2, y_2, z_2)	$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}, \frac{z_1 + z_2}{2} \right)$
5.2	Scalar product	$\boldsymbol{v} \cdot \boldsymbol{w} = \lvert \boldsymbol{v} \rvert \lvert \boldsymbol{w} \rvert \cos\theta$, where θ is the angle between $\boldsymbol{v}$ and $\boldsymbol{w}$ $\boldsymbol{v} \cdot \boldsymbol{w} = v_1 w_1 + v_2 w_2 + v_3 w_3$, where $\boldsymbol{v} = \begin{pmatrix} v_1 \\ v_2 \\ v_3 \end{pmatrix}$, $\boldsymbol{w} = \begin{pmatrix} w_1 \\ w_2 \\ w_3 \end{pmatrix}$
	Angle between two vectors	$\cos\theta = \frac{v_1 w_1 + v_2 w_2 + v_3 w_3}{\lvert \boldsymbol{v} \rvert \lvert \boldsymbol{w} \rvert}$
5.3	Vector equation of a line	$\boldsymbol{r} = \boldsymbol{a} + \lambda \boldsymbol{b}$
	Parametric form of equations of a line	$x = x_0 + \lambda l,\ y = y_0 + \lambda m,\ z = z_0 + \lambda n$
	Cartesian equations of a line	$\frac{x - x_0}{l} = \frac{y - y_0}{m} = \frac{z - z_0}{n}$
5.5	Vector product (Determinant representation)	$\boldsymbol{v} \times \boldsymbol{w} = \begin{vmatrix} \boldsymbol{i} & \boldsymbol{j} & \boldsymbol{k} \\ v_1 & v_2 & v_3 \\ w_1 & w_2 & w_3 \end{vmatrix}$ $\lvert \boldsymbol{v} \times \boldsymbol{w} \rvert = \lvert \boldsymbol{v} \rvert \lvert \boldsymbol{w} \rvert \sin\theta$, where θ is the angle between $\boldsymbol{v}$ and $\boldsymbol{w}$
	Area of a triangle	$A = \frac{1}{2} \lvert \boldsymbol{v} \times \boldsymbol{w} \rvert$
5.6	Vector equation of a plane	$\boldsymbol{r} = \boldsymbol{a} + \lambda \boldsymbol{b} + \mu \boldsymbol{c}$
	Equation of a plane (using the normal vector)	$\boldsymbol{r} \cdot \boldsymbol{n} = \boldsymbol{a} \cdot \boldsymbol{n}$
	Cartesian equation of a plane	$ax + by + cz + d = 0$

Topic 6—Core: Statistics and probability

6.3		Let $n = \sum_{i=1}^{k} f_i$
	Population parameters	
	Mean μ	$\mu = \frac{\sum_{i=1}^{k} f_i x_i}{n}$
	Variance σ^2	$\sigma^2 = \frac{\sum_{i=1}^{k} f_i (x_i - \mu)^2}{n} = \frac{\sum_{i=1}^{k} f_i x_i^2}{n} - \mu^2$
	Standard deviation σ	$\sigma = \sqrt{\frac{\sum_{i=1}^{k} f_i (x_i - \mu)^2}{n}}$
	Sample statistics	
	Mean $\bar{x}$	$\bar{x} = \frac{\sum_{i=1}^{k} f_i x_i}{n}$
	Variance s_n^2	$s_n^2 = \frac{\sum_{i=1}^{k} f_i (x_i - \bar{x})^2}{n} = \frac{\sum_{i=1}^{k} f_i x_i^2}{n} - \bar{x}^2$
	Standard deviation s_n	$s_n = \sqrt{\frac{\sum_{i=1}^{k} f_i (x_i - \bar{x})^2}{n}}$
	Unbiased estimate of population variance s_{n-1}^2	$s_{n-1}^2 = \frac{n}{n-1} s_n^2 = \frac{\sum_{i=1}^{k} f_i (x_i - \bar{x})^2}{n-1} = \frac{\sum_{i=1}^{k} f_i x_i^2}{n-1} - \frac{n}{n-1}\bar{x}^2$
6.5	Probability of an event A	$\mathrm{P}(A) = \frac{n(A)}{n(U)}$
	Complementary events	$\mathrm{P}(A) + \mathrm{P}(A') = 1$
6.6	Combined events	$\mathrm{P}(A \cup B) = \mathrm{P}(A) + \mathrm{P}(B) - \mathrm{P}(A \cap B)$
	Mutually exclusive events	$\mathrm{P}(A \cup B) = \mathrm{P}(A) + \mathrm{P}(B)$

Topic 6—Core: Statistics and probability (continued)

6.7	Conditional probability	$\mathrm{P}(A \mid B) = \dfrac{\mathrm{P}(A \cap B)}{\mathrm{P}(B)}$
	Independent events	$\mathrm{P}(A \cap B) = \mathrm{P}(A)\,\mathrm{P}(B)$
	Bayes' Theorem	$\mathrm{P}(B \mid A) = \dfrac{\mathrm{P}(B)\mathrm{P}(A \mid B)}{\mathrm{P}(B)\mathrm{P}(A \mid B) + \mathrm{P}(B')\mathrm{P}(A \mid B')}$
6.9	Expected value of a discrete random variable X	$\mathrm{E}(X) = \mu = \sum_x x\,\mathrm{P}(X = x)$
	Expected value of a continuous random variable X	$\mathrm{E}(X) = \mu = \int_{-\infty}^{\infty} x\,f(x)\,\mathrm{d}x$
	Variance	$\mathrm{Var}(X) = \mathrm{E}(X-\mu)^2 = \mathrm{E}(X^2) - [\mathrm{E}(X)]^2$
	Variance of a discrete random variable X	$\mathrm{Var}(X) = \sum (x-\mu)^2\,\mathrm{P}(X = x) = \sum x^2\,\mathrm{P}(X = x) - \mu^2$
	Variance of a continuous random variable X	$\mathrm{Var}(X) = \int_{-\infty}^{\infty} (x-\mu)^2 f(x)\,\mathrm{d}x = \int_{-\infty}^{\infty} x^2 f(x)\,\mathrm{d}x - \mu^2$
6.10	Binomial distribution	$X \sim \mathrm{B}(n, p) \Rightarrow \mathrm{P}(X = x) = \binom{n}{x} p^x (1-p)^{n-x},\ x = 0, 1, \ldots, n$
	Mean	$\mathrm{E}(X) = np$
	Variance	$\mathrm{Var}(X) = np(1-p)$
	Poisson distribution	$X \sim \mathrm{P_o}(m) \Rightarrow \mathrm{P}(X = x) = \dfrac{m^x \mathrm{e}^{-m}}{x!},\ x = 0, 1, 2, \ldots$
	Mean	$\mathrm{E}(X) = m$
	Variance	$\mathrm{Var}(X) = m$
6.11	Standardized normal variable	$z = \dfrac{x-\mu}{\sigma}$

Topic 7—Core: Calculus

7.1	Derivative of $f(x)$	$y = f(x) \Rightarrow \frac{\mathrm{d}y}{\mathrm{d}x} = f'(x) = \lim_{h \to 0}\left(\frac{f(x+h)-f(x)}{h}\right)$
	Derivative of x^n	$f(x) = x^n \Rightarrow f'(x) = nx^{n-1}$
	Derivative of $\sin x$	$f(x) = \sin x \Rightarrow f'(x) = \cos x$
	Derivative of $\cos x$	$f(x) = \cos x \Rightarrow f'(x) = -\sin x$
	Derivative of $\tan x$	$f(x) = \tan x \Rightarrow f'(x) = \sec^2 x$
	Derivative of e^x	$f(x) = \mathrm{e}^x \Rightarrow f'(x) = \mathrm{e}^x$
	Derivative of $\ln x$	$f(x) = \ln x \Rightarrow f'(x) = \frac{1}{x}$
	Derivative of $\sec x$	$f(x) = \sec x \Rightarrow f'(x) = \sec x \tan x$
	Derivative of $\csc x$	$f(x) = \csc x \Rightarrow f'(x) = -\csc x \cot x$
	Derivative of $\cot x$	$f(x) = \cot x \Rightarrow f'(x) = -\csc^2 x$
	Derivative of a^x	$f(x) = a^x \Rightarrow f'(x) = a^x (\ln a)$
	Derivative of $\log_a x$	$f(x) = \log_a x \Rightarrow f'(x) = \frac{1}{x \ln a}$
	Derivative of $\arcsin x$	$f(x) = \arcsin x \Rightarrow f'(x) = \frac{1}{\sqrt{1-x^2}}$
	Derivative of $\arccos x$	$f(x) = \arccos x \Rightarrow f'(x) = -\frac{1}{\sqrt{1-x^2}}$
	Derivative of $\arctan x$	$f(x) = \arctan x \Rightarrow f'(x) = \frac{1}{1+x^2}$
7.2	Chain rule	$y = g(u)$, where $u = f(x) \Rightarrow \frac{\mathrm{d}y}{\mathrm{d}x} = \frac{\mathrm{d}y}{\mathrm{d}u} \times \frac{\mathrm{d}u}{\mathrm{d}x}$
	Product rule	$y = uv \Rightarrow \frac{\mathrm{d}y}{\mathrm{d}x} = u\frac{\mathrm{d}v}{\mathrm{d}x} + v\frac{\mathrm{d}u}{\mathrm{d}x}$
	Quotient rule	$y = \frac{u}{v} \Rightarrow \frac{\mathrm{d}y}{\mathrm{d}x} = \frac{v\frac{\mathrm{d}u}{\mathrm{d}x} - u\frac{\mathrm{d}v}{\mathrm{d}x}}{v^2}$

Topic 7—Core: Calculus (continued)

7.4	Standard integrals	$\int x^n \,\mathrm{d}x = \frac{x^{n+1}}{n+1} + C, \quad n \neq -1$ $\int \frac{1}{x} \,\mathrm{d}x = \ln\lvert x\rvert + C$ $\int \sin x \,\mathrm{d}x = -\cos x + C$ $\int \cos x \,\mathrm{d}x = \sin x + C$ $\int \mathrm{e}^x \,\mathrm{d}x = \mathrm{e}^x + C$ $\int a^x \,\mathrm{d}x = \frac{1}{\ln a} a^x + C$ $\int \frac{1}{a^2 + x^2} \mathrm{d}x = \frac{1}{a} \arctan\left(\frac{x}{a}\right) + C$ $\int \frac{1}{\sqrt{a^2 - x^2}} \mathrm{d}x = \arcsin\left(\frac{x}{a}\right) + C, \quad \lvert x\rvert < a$
7.5	Area under a curve Volume of revolution (rotation)	$A = \int_a^b y \mathrm{d}x$ or $A = \int_a^b x \mathrm{d}y$ $V = \int_a^b \pi y^2 \mathrm{d}x$ or $V = \int_a^b \pi x^2 \mathrm{d}y$
7.9	Integration by parts	$\int u \frac{\mathrm{d}v}{\mathrm{d}x} \mathrm{d}x = uv - \int v \frac{\mathrm{d}u}{\mathrm{d}x} \mathrm{d}x$ or $\int u \mathrm{d}v = uv - \int v \mathrm{d}u$

Topic 8—Option: Statistics and probability (further mathematics SL topic 2)

8.1 (2.1)	Linear combinations of two independent random variables X_1, X_2	$\mathrm{E}(a_1X_1 \pm a_2X_2) = a_1\mathrm{E}(X_1) \pm a_2\mathrm{E}(X_2)$ $\mathrm{Var}(a_1X_1 \pm a_2X_2) = a_1^2\,\mathrm{Var}(X_1) + a_2^2\,\mathrm{Var}(X_2)$
8.4 (2.4)	**Confidence intervals**	
	Mean, with known variance	$\bar{x} \pm z \times \frac{\sigma}{\sqrt{n}}$
	Mean, with unknown variance	$\bar{x} \pm t \times \frac{s_{n-1}}{\sqrt{n}}$
	Population	$\hat{P} \pm z\sqrt{\frac{\hat{P}(1-\hat{P})}{n}}$, where $\hat{P}$ is the proportion of successes in the sample
8.5 (2.5)	**Test statistics**	
	Mean, with known variance	$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$
	Mean, with unknown variance	$t = \frac{\bar{x} - \mu}{s_{n-1}/\sqrt{n}}$
8.6 (2.6)	The χ^2 test statistic	$\chi^2_{calc} = \sum \frac{(f_o - f_e)^2}{f_e} = \sum \frac{f_o^2}{f_e} - n$, where f_o are the observed frequencies, f_e are the expected frequencies, $n = \sum f_o$

Topic 9—Option: Sets, relations and groups (further mathematics SL topic 3)

9.1 (3.1)	De Morgan's laws	$(A \cup B)' = A' \cap B'$ $(A \cap B)' = A' \cup B'$

Topic 10—Option: Series and differential equations (further mathematics SL topic 4)

10.5 (4.5)	Maclaurin series	$f(x) = f(0) + x f'(0) + \frac{x^2}{2!} f''(0) + \ldots$
	Taylor series	$f(x) = f(a) + (x-a) f'(a) + \frac{(x-a)^2}{2!} f''(a) + \ldots$
	Taylor approximations (with error term $R_n(x)$)	$f(x) = f(a) + (x-a) f'(a) + \ldots + \frac{(x-a)^n}{n!} f^{(n)}(a) + R_n(x)$
	Lagrange form	$R_n(x) = \frac{f^{(n+1)}(c)}{(n+1)!}(x-a)^{n+1}$, where c lies between a and x
	Integral form	$R_n(x) = \int_a^x \frac{f^{(n+1)}(t)}{n!}(x-t)^n \, \mathrm{d}t$
	Other series	$\mathrm{e}^x = 1 + x + \frac{x^2}{2!} + \ldots$ $\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \ldots$ $\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \ldots$ $\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \ldots$ $\arctan x = x - \frac{x^3}{3} + \frac{x^5}{5} - \ldots$
10.6 (4.6)	Euler's method	$y_{n+1} = y_n + h \times f(x_n, y_n)$; $x_{n+1} = x_n + h$, where h is a constant
	Integrating factor for $y' + P(x)y = Q(x)$	$\mathrm{e}^{\int P(x)\mathrm{d}x}$

Topic 11—Option: Discrete mathematics (further mathematics SL topic 5)

11.6 (5.6)	Euler's relation	$v - e + f = 2$, where v is the number of vertices, e is the number of edges, f is the number of faces
	Planar graphs	$e \le 3v - 6$ $e \le 2v - 4$

Formulae for distributions
(topic 8.2, further mathematics SL topic 2.2)

Discrete distributions

Distribution	Notation	Probability mass function	Mean	Variance
Bernoulli	$X \sim \mathrm{B}(1, p)$	$p^x(1-p)^{1-x}$ for $x = 0, 1$	p	$p(1-p)$
Binomial	$X \sim \mathrm{B}(n, p)$	$\binom{n}{x} p^x (1-p)^{n-x}$ for $x = 0,1,\ldots,n$	np	$np(1-p)$
Hypergeometric	$X \sim \mathrm{Hyp}(n, M, N)$	$\dfrac{\binom{M}{x}\binom{N-M}{n-x}}{\binom{N}{n}}$ for $x = 0,1,\ldots,n$	np where $p = \dfrac{M}{N}$	$np(1-p)\left(\dfrac{N-n}{N-1}\right)$ where $p = \dfrac{M}{N}$
Poisson	$X \sim \mathrm{P_o}(m)$	$\dfrac{m^x \mathrm{e}^{-m}}{x!}$ for $x = 0,1\ldots$	m	m
Geometric	$X \sim \mathrm{Geo}(p)$	pq^{x-1} for $x = 1, 2,\ldots$	$\dfrac{1}{p}$	$\dfrac{q}{p^2}$
Negative binomial	$X \sim \mathrm{NB}(r, p)$	$\binom{x-1}{r-1} p^r q^{x-r}$ for $x = r, r+1,\ldots$	$\dfrac{r}{p}$	$\dfrac{rq}{p^2}$
Discrete uniform	$X \sim \mathrm{DU}(n)$	$\dfrac{1}{n}$ for $x = 1,\ldots,n$	$\dfrac{n+1}{2}$	$\dfrac{n^2-1}{12}$

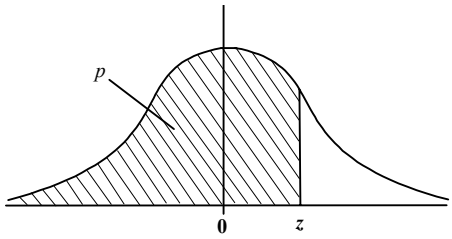
Continuous distributions

Distribution	Notation	Probability density function	Mean	Variance
Uniform	$X \sim \mathrm{U}(a,b)$	$\frac{1}{(b-a)},\ a \le x \le b$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$
Exponential	$X \sim \mathrm{Exp}(\lambda)$	$\lambda \mathrm{e}^{-\lambda x},\ \ x \ge 0$	$\frac{1}{\lambda}$	$\frac{1}{\lambda^2}$
Normal	$X \sim \mathrm{N}(\mu,\sigma^2)$	$\frac{1}{\sigma\sqrt{2\pi}}\mathrm{e}^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$	μ	σ^2

Statistical tables

Area under the standard normal curve (topic 6.11)

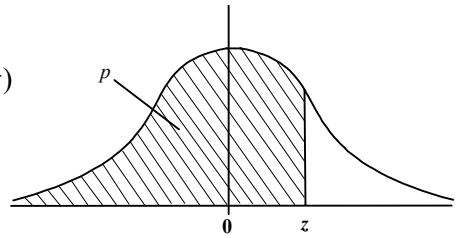
$p = \mathrm{P}(Z \leq z)$



z	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8079	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9773	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9892	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9983	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9988	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998
3.5	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998

Inverse normal probabilities (topic 6.11)

$p = \mathrm{P}(Z \leq z)$



p	0	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
0.50	0.0000	0.0025	0.0050	0.0075	0.0100	0.0125	0.0150	0.0176	0.0201	0.0226
0.51	0.0251	0.0276	0.0301	0.0326	0.0351	0.0376	0.0401	0.0426	0.0451	0.0476
0.52	0.0502	0.0527	0.0552	0.0577	0.0602	0.0627	0.0652	0.0677	0.0702	0.0728
0.53	0.0753	0.0778	0.0803	0.0828	0.0853	0.0878	0.0904	0.0929	0.0954	0.0979
0.54	0.1004	0.1030	0.1055	0.1080	0.1105	0.1130	0.1156	0.1181	0.1206	0.1231
0.55	0.1257	0.1282	0.1307	0.1332	0.1358	0.1383	0.1408	0.1434	0.1459	0.1484
0.56	0.1510	0.1535	0.1560	0.1586	0.1611	0.1637	0.1662	0.1687	0.1713	0.1738
0.57	0.1764	0.1789	0.1815	0.1840	0.1866	0.1891	0.1917	0.1942	0.1968	0.1993
0.58	0.2019	0.2045	0.2070	0.2096	0.2121	0.2147	0.2173	0.2198	0.2224	0.2250
0.59	0.2275	0.2301	0.2327	0.2353	0.2379	0.2404	0.2430	0.2456	0.2482	0.2508
0.60	0.2534	0.2559	0.2585	0.2611	0.2637	0.2663	0.2689	0.2715	0.2741	0.2767
0.61	0.2793	0.2819	0.2845	0.2872	0.2898	0.2924	0.2950	0.2976	0.3002	0.3029
0.62	0.3055	0.3081	0.3107	0.3134	0.3160	0.3186	0.3213	0.3239	0.3266	0.3292
0.63	0.3319	0.3345	0.3372	0.3398	0.3425	0.3451	0.3478	0.3505	0.3531	0.3558
0.64	0.3585	0.3611	0.3638	0.3665	0.3692	0.3719	0.3745	0.3772	0.3799	0.3826
0.65	0.3853	0.3880	0.3907	0.3934	0.3961	0.3989	0.4016	0.4043	0.4070	0.4097
0.66	0.4125	0.4152	0.4179	0.4207	0.4234	0.4262	0.4289	0.4316	0.4344	0.4372
0.67	0.4399	0.4427	0.4454	0.4482	0.4510	0.4538	0.4565	0.4593	0.4621	0.4649
0.68	0.4677	0.4705	0.4733	0.4761	0.4789	0.4817	0.4845	0.4874	0.4902	0.4930
0.69	0.4959	0.4987	0.5015	0.5044	0.5072	0.5101	0.5129	0.5158	0.5187	0.5215
0.70	0.5244	0.5273	0.5302	0.5331	0.5359	0.5388	0.5417	0.5446	0.5476	0.5505
0.71	0.5534	0.5563	0.5592	0.5622	0.5651	0.5681	0.5710	0.5740	0.5769	0.5799
0.72	0.5828	0.5858	0.5888	0.5918	0.5948	0.5978	0.6008	0.6038	0.6068	0.6098
0.73	0.6128	0.6158	0.6189	0.6219	0.6250	0.6280	0.6311	0.6341	0.6372	0.6403
0.74	0.6434	0.6464	0.6495	0.6526	0.6557	0.6588	0.6620	0.6651	0.6682	0.6714
0.75	0.6745	0.6776	0.6808	0.6840	0.6871	0.6903	0.6935	0.6967	0.6999	0.7031

Inverse normal probabilities (topic 6.11, continued)

p	0	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
0.76	0.7063	0.7095	0.7128	0.7160	0.7192	0.7225	0.7257	0.7290	0.7323	0.7356
0.77	0.7389	0.7421	0.7455	0.7488	0.7521	0.7554	0.7588	0.7621	0.7655	0.7688
0.78	0.7722	0.7756	0.7790	0.7824	0.7858	0.7892	0.7926	0.7961	0.7995	0.8030
0.79	0.8064	0.8099	0.8134	0.8169	0.8204	0.8239	0.8274	0.8310	0.8345	0.8381
0.80	0.8416	0.8452	0.8488	0.8524	0.8560	0.8596	0.8633	0.8669	0.8706	0.8742
0.81	0.8779	0.8816	0.8853	0.8890	0.8927	0.8965	0.9002	0.9040	0.9078	0.9116
0.82	0.9154	0.9192	0.9230	0.9269	0.9307	0.9346	0.9385	0.9424	0.9463	0.9502
0.83	0.9542	0.9581	0.9621	0.9661	0.9701	0.9741	0.9782	0.9822	0.9863	0.9904
0.84	0.9945	0.9986	1.0027	1.0069	1.0110	1.0152	1.0194	1.0237	1.0279	1.0322
0.85	1.0364	1.0407	1.0451	1.0494	1.0537	1.0581	1.0625	1.0669	1.0714	1.0758
0.86	1.0803	1.0848	1.0894	1.0939	1.0985	1.1031	1.1077	1.1123	1.1170	1.1217
0.87	1.1264	1.1311	1.1359	1.1407	1.1455	1.1504	1.1552	1.1601	1.1651	1.1700
0.88	1.1750	1.1800	1.1850	1.1901	1.1952	1.2004	1.2055	1.2107	1.2160	1.2212
0.89	1.2265	1.2319	1.2372	1.2426	1.2481	1.2536	1.2591	1.2646	1.2702	1.2759
0.90	1.2816	1.2873	1.2930	1.2988	1.3047	1.3106	1.3165	1.3225	1.3285	1.3346
0.91	1.3408	1.3469	1.3532	1.3595	1.3658	1.3722	1.3787	1.3852	1.3917	1.3984
0.92	1.4051	1.4118	1.4187	1.4255	1.4325	1.4395	1.4466	1.4538	1.4611	1.4684
0.93	1.4758	1.4833	1.4909	1.4985	1.5063	1.5141	1.5220	1.5301	1.5382	1.5464
0.94	1.5548	1.5632	1.5718	1.5805	1.5893	1.5982	1.6073	1.6164	1.6258	1.6352
0.95	1.6449	1.6546	1.6646	1.6747	1.6849	1.6954	1.7060	1.7169	1.7279	1.7392
0.96	1.7507	1.7624	1.7744	1.7866	1.7991	1.8119	1.8250	1.8384	1.8522	1.8663
0.97	1.8808	1.8957	1.9110	1.9268	1.9431	1.9600	1.9774	1.9954	2.0141	2.0335
0.98	2.0538	2.0749	2.0969	2.1201	2.1444	2.1701	2.1973	2.2262	2.2571	2.2904
0.99	2.3264	2.3656	2.4089	2.4573	2.5121	2.5758	2.6521	2.7478	2.8782	3.0902