

Standard Normal Probability Formulas

Formulas written in probability notation

Formulas in terms of left area

To find a right area

$$P(Z > z) = 1 - P(Z < z)$$

To find a central area (assuming $z > 0$)

$$P(|Z| < z) = 2P(Z < z) - 1$$

To find a two-tail area (assuming $z > 0$)

$$P(|Z| > z) = 2 - 2P(Z < z)$$

To find an arbitrary area (assuming $z_2 > z_1$)

$$P(z_1 < Z < z_2) = P(Z < z_2) - P(Z < z_1)$$

Formulas solved for left area

To find a left area from a right area

$$P(Z < z) = 1 - P(Z > z)$$

To find a left area from a central area (assuming $z > 0$)

$$P(Z < z) = \frac{P(|Z| < z) + 1}{2}$$

To find a left area from a two-tail area (assuming $z > 0$)

$$P(Z < z) = \frac{2 - P(|Z| > z)}{2}$$

Formulas written in nonstandard notation

Let's use a shorter notation.

$$L = \text{left area} = P(Z < z)$$

$$R = \text{right area} = P(Z > z)$$

$$C = \text{central area} = P(|Z| < z)$$

$$T = \text{two-tail area} = P(|Z| > z)$$

To find a right area

$$R = 1 - L$$

To find a central area (assuming $z > 0$)

$$C = 2L - 1$$

To find a two-tail area (assuming $z > 0$)

$$T = 2 - 2L$$

Formulas solved for left area

To find a left area from a right area

$$L = 1 - R$$

To find a left area from a central area (assuming $z > 0$)

$$L = \frac{C + 1}{2}$$

To find a left area from a two-tail area (assuming $z > 0$)

$$L = \frac{2 - T}{2}$$

Graphic representation

