Important Line Formulas PDF

Formulas
Examples
with Units

List of 15
Important Line Formulas

1) Number of Straight Lines using Non Collinear Points Formula

Evaluate Formula

Formula

$$N_{Lines} = C\left(N_{Non\ Collinear}, 2\right)$$

Example

$$36 = C\left(9, 2\right)$$

2) Shortest Distance of Arbitrary Point from Line Formula

Evaluate Formula

Formula

$$d = \operatorname{mod} us\left(\frac{\left(L_x \cdot x_a\right) + \left(L_y \cdot y_a\right) + c_{Line}}{\sqrt{\left(L_x^{\,2}\right) + \left(L_y^{\,2}\right)}}\right)$$

Example

$$9.8387 = \operatorname{mod} us\left(\frac{\left(6 \cdot 5\right) + \left(-3 \cdot -2\right) + 30}{\sqrt{\left(6^{2}\right) + \left(-3^{2}\right)}}\right)$$

3) Shortest Distance of Line from Origin Formula

Evaluate Formula

Formula

$$d_{Origin} = \operatorname{mod} us\left(\frac{c_{Line}}{\sqrt{\left(L_x^{\,2}\right) + \left(L_y^{\,2}\right)}}\right)$$

Example

$$4.4721 = \operatorname{mod} us\left(\frac{30}{\sqrt{\left(6^{2}\right) + \left(-3^{2}\right)}}\right)$$

4) X Coefficient of Line given Slope Formula

Evaluate Formula

Formula

$$L_x = -\left(L_y \cdot m\right)$$

Example

$$6 = -\left(-3 \cdot 2\right)$$

5) Pair of Lines Formulas

5.1) Acute Angle between Pair of Lines Formula

Evaluate Formula

Formula

$$\angle_{Acute} = \arctan\left(\left|\frac{m_2 - (m_1)}{1 + (m_1) \cdot m_2}\right|\right)$$

Example with Units

$$22.6199° = \arctan\left(\left|\frac{-0.2 - (0.2)}{1 + (0.2) \cdot -0.2}\right|\right)$$

5.2) Obtuse Angle between Pair of Lines Formula

Evaluate Formula

Formula

$$\angle_{Obtuse} = \pi - \arctan\left(\left|\frac{m_2 - (m_1)}{1 + (m_1) \cdot m_2}\right|\right)$$

Example with Units

$$157.3801° = 3.1416 - \arctan\left(\left|\frac{-0.2 - (0.2)}{1 + (0.2) \cdot -0.2}\right|\right)$$

5.3) Shortest Distance between Parallel Lines Formula

Evaluate Formula

Formula

$$d_{Parallel\ Lines} = \operatorname{mod} us\frac{c_1 - (c_2)}{\sqrt{(L_x^2) + (L_y^2)}}$$

Example

$$14.9071 = \operatorname{mod} us\frac{-50 - (50)}{\sqrt{(6^2) + (-3^2)}}$$

6) Slope Formulas

6.1) Slope of Line Formulas

6.1.1) Slope of Line Formula

Evaluate Formula

Formula

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Example

$$2 = \frac{-25 - 45}{-20 - 15}$$

6.1.2) Slope of Line given Angle with X-Axis Formula

Evaluate Formula

Formula

$$m = \tan(\angle_{Inclination})$$

Example with Units

$$2.1445 = \tan(65°)$$

6.1.3) Slope of Line given Numerical Coefficients Formula

Evaluate Formula

Formula

$$m = -\frac{L_x}{L_y}$$

Example

$$2 = -\frac{6}{-3}$$

6.1.4) Slope of Line given Slope of Perpendicular Formula

Evaluate Formula

Formula

$$m = -\frac{1}{m_{\perp}}$$

Example

$$2 = -\frac{1}{-0.5}$$

6.2) Slope of Perpendicular of Line Formulas

6.2.1) Slope of Perpendicular of Line Formula

Evaluate Formula

Formula

$$m_{\perp} = -\frac{1}{m}$$

Example

$$-0.5 = -\frac{1}{2}$$

6.2.2) Slope of Perpendicular of Line given Angle of Line with X-Axis Formula

Evaluate Formula

Formula

$$m_{\perp} = -\frac{1}{\tan\left(\angle_{Inclination}\right)}$$

Example with Units

$$-0.4663 = -\frac{1}{\tan\left(65°\right)}$$

6.2.3) Slope of Perpendicular of Line given Numerical Coefficients of Line Formula

Evaluate Formula

Formula

$$m_{\perp} = \frac{L_y}{L_x}$$

Example

$$-0.5 = \frac{-3}{6}$$

6.2.4) Slope of Perpendicular of Line given Two Points on Line Formula

Evaluate Formula

Formula

$$m_{\perp} = -\frac{x_2 - x_1}{y_2 - y_1}$$

Example

$$-0.5 = -\frac{-20 - 15}{-25 - 45}$$

Variables used in list of Line Formulas above

- $\angle_{Acute}$ Acute Angle between Pair of Lines *(Degree)*
- $\angle_{Inclination}$ Angle of Inclination of Line *(Degree)*
- $\angle_{Obtuse}$ Obtuse Angle between Pair of Lines *(Degree)*
- c_1 Constant Term of First Line
- c_2 Constant Term of Second Line
- c_{Line} Constant Term of Line
- d Shortest Distance of a Point from Line
- d_{Origin} Shortest Distance of Line from Origin
- $d_{Parallel\ Lines}$ Shortest Distance of Parallel Lines
- L_x X Coefficient of Line
- L_y Y Coefficient of Line
- m Slope of Line
- $m_\perp$ Slope of Perpendicular of a Line
- m_1 Slope of First Line
- m_2 Slope of Second Line
- N_{Lines} Number of Straight Lines
- $N_{Non\ Collinear}$ Number of Non Collinear Points
- x_1 X Coordinate of First Point in Line
- x_2 X Coordinate of Second Point in Line
- x_a X Coordinate of Arbitrary Point
- y_1 Y Coordinate of First Point in Line
- y_2 Y Coordinate of Second Point in Line
- y_a Y Coordinate of Arbitrary Point

Constants, Functions, Measurements used in list of Line Formulas above

- constant(s): **pi**, 3.14159265358979323846264338327950288 *Archimedes' constant*
- Functions: **abs**, abs(Number) *The absolute value of a number is its distance from zero on the number line. It's always a positive value, as it represents the magnitude of a number without considering its direction.*
- Functions: **arctan**, arctan(Number) *Inverse trigonometric functions are usually accompanied by the prefix - arc. Mathematically, we represent arctan or the inverse tangent function as tan-1 x or arctan(x).*
- Functions: **C**, C(n,k) *In combinatorics, the binomial coefficient is a way to represent the number of ways to choose a subset of objects from a larger set. It is also known as the "n choose k" tool.*
- Functions: **ctan**, ctan(Angle) *Cotangent is a trigonometric function that is defined as the ratio of the adjacent side to the opposite side in a right triangle.*
- Functions: **modulus**, modulus *Modulus of a number is the remainder when that number is divided by another number.*
- Functions: **sqrt**, sqrt(Number) *A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.*
- Functions: **tan**, tan(Angle) *The tangent of an angle is a trigonometric ratio of the length of the side opposite an angle to the length of the side adjacent to an angle in a right triangle.*
- Measurement: **Angle** in Degree (°) *Angle Unit Conversion*

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