Intersection of Two Lines

MATLAB Implementation

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LICENSE

Contents

line_intersection

Finds the intersection of two lines.

Syntax

```
[x,y] = line_intersection([m1,b1],[m2,b2])
[x,y] = line_intersection([x1,y1,m1],[x2,y2,m2])
```

Description

`[x,y] = line_intersection([m1,b1],[m2,b2])` returns the intersection (x, y) of two lines given in slope-intercept form:

1. $y_1 = m_1 x + b_1$
2. $y_2 = m_2 x + b_2$

`[x,y] = line_intersection([m1,b1],[m2,b2])` returns the intersection (x, y) of two lines given in point-slope form:

1. $y - y_1 = m_1(x - x_1)$
2. $y - y_2 = m_2(x - x_2)$

Examples

Example 1

Find the intersection of $y = 5x + 2$ and $y - 4 = 7(x - 10)$.

■ *SOLUTION*

To find the intersection point, we just have to note that for the first line, we have $m_1 = 5$ and $b_1 = 2$, while for the second line, we have $x_2 = 10$, $y_2 = 4$, and $m_2 = 7$.

```
% line 1 parameters
m1 = 5;
b1 = 2;

% line 2 parameters
x2 = 10;
y2 = 4;
m2 = 7;

% finds intersection point
[x_int,y_int] = line_intersection([m1,b1],[x2,y2,m2])
```

This yields the result

```
x_int =

    34
```

```
y_int =

   172
```

Links

MATLAB® Central's File Exchange:
https://www.mathworks.com/matlabcentral/fileexchange/85428-intersection-of-two-lines-line_intersection

GitHub®:
https://github.com/tamaskis/line_intersection-MATLAB

Intersection of Two Lines

Consider the following two lines given in point-slope form:

$$y - y_1 = m_1 (x - x_1)$$

$$y - y_2 = m_2 (x - x_2)$$

If these two lines intersect at $(x_{\text{int}}, y_{\text{int}})$, then

$$y_{\text{int}} - y_1 = m_1 (x_{\text{int}} - x_1) \tag{1}$$

$$y_{\text{int}} - y_2 = m_2 (x_{\text{int}} - x_2) \tag{2}$$

Solving Eqs. (1) and (2) for y_{int},

$$y_{\text{int}} = y_1 + m_1 (x_{\text{int}} - x_1) \tag{3}$$

$$y_{\text{int}} = y_2 + m_2 (x_{\text{int}} - x_2) \tag{4}$$

Equating Eqs. (3) and (4),

$$y_1 + m_1 (x_{\text{int}} - x_1) = y_2 + m_2 (x_{\text{int}} - x_2)$$

Solving for x_{int},

$$\boxed{x_{\text{int}} = \frac{(m_1 x_1 - m_2 x_2) - (y_1 - y_2)}{m_1 - m_2}} \tag{5}$$

To obtain y_{int}, we can use either line. We choose to use line 1.

$$\boxed{y_{\text{int}} = y_1 + m_1 (x_{\text{int}} - x_1)} \tag{6}$$