205001102
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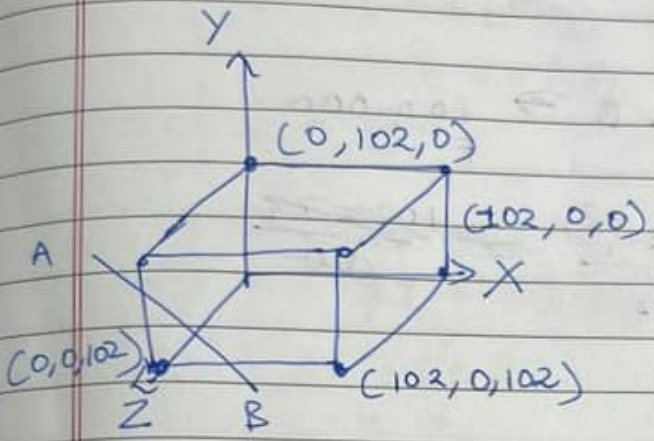
CG&M Assignment 1



Let the line segment passing through 2 plans be A(-30, 50, 72)
B(30, 60, 122)

Region Codes

A = 000001
B = 100000
F B T B R L

Trivial Accept

(OR) (A) 000001
(B) 100000
100001 ⇒ fails

Trivial Reject

(AND) (A) 000001
(B) 100000
000000 ⇒ fails

Slope

$$m = \begin{bmatrix} x_2 - x_1 \\ y_2 - y_1 \\ z_2 - z_1 \end{bmatrix} = \begin{bmatrix} +60 \\ 10 \\ 60 \end{bmatrix}$$

3D line eqn

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} x_1 \\ y_1 \\ z_1 \end{bmatrix} + t \begin{bmatrix} mx \\ my \\ mz \end{bmatrix}$$

for z axis

region code for B ⇒ 100 000
F

$t = \frac{z_{max} - z_1}{m_z}$ ~~$\frac{102-72}{50}$~~

$z_{max} = 102$

$\Rightarrow t = \frac{102 - 72}{50} = \frac{30}{50} = \frac{3}{5}$

$t = 0.6$

$z = z_{max} = 102$

$y = y_1 + t(m_y)$
$= 50 + 0.6\,(10)$
$y = 56$

$x = x_1 + t(m_x)$
$= -30 + 0.6(+60)$
$= -30 + 36$
$x = 6$

$B = (6, 56, 102)$

For A point
region code for A ⇒ 000 001
L

$t = \frac{x_{min} - x_1}{m_x}$

$x = x_{min} = 0$

$\Rightarrow t = \frac{0 - (-30)}{60} = \frac{30}{60} = \frac{1}{2} = 0.5$

$y = y_1 + t(m_y)$

$= 50 + 0.5(10)$

$y = 55$

$z = z_1 + t(m_z)$

$= 72 + 0.5(50)$

$= 72 + 25$

$z = 97$

$A = (0, 55, 97)$

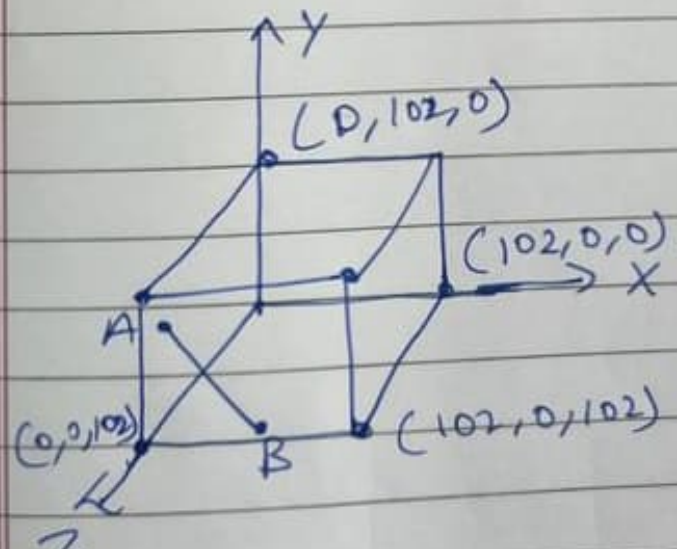
Region code

(OR) A ⇒ 0 0 0 0 0 0

B ⇒ 0 0 0 0 0 0

0 0 0 0 0 0 ⇒ pass trivial accept.

⇒ Clipped line segment is

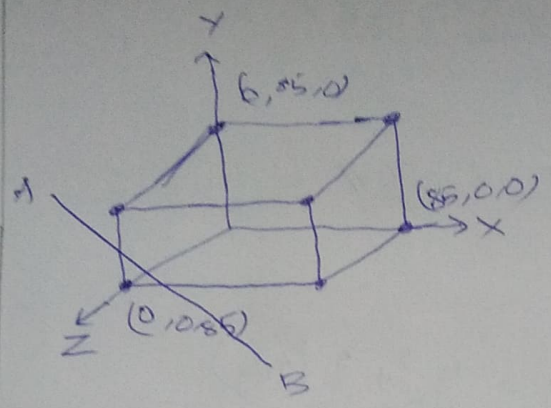


A = (0, 55, 97)

B = (6, 56, 102)

CGM2 Assignment.

205001085
V. Saboorivasan
CSE-B



Let line segment passing through 2 planes be
A (-30, 50, 72)
B (30, 60, 122)

Region codes

A = 0 0 0 0 0 1
B = 1 0 0 0 0 0
F B T B R L

Trivial Accept

(OR) (A) 000001
(B) 100000
100001 → fails

Trivial Reject

(AND) (A) 000001
(B) 100000
000000 → fails

Slope $m = \begin{bmatrix} x_2-x_1 \\ y_2-y_1 \\ z_2-z_1 \end{bmatrix} = \begin{bmatrix} 60 \\ 10 \\ 80 \end{bmatrix}$

3D line equation $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} x_1 \\ y_1 \\ z_1 \end{bmatrix} + t \begin{bmatrix} m_x \\ m_y \\ m_z \end{bmatrix}$

For z-axis

region code for B → 100000

$$t = \frac{z_{max} - z_1}{m_z} \quad ; \quad z_{max} = 85$$

$$\Rightarrow t = \frac{85 - 72}{50} = \frac{13}{50} = 0.26 //$$

$$\Rightarrow z = z_{max} = 85$$

$$x = x_1 + t(m_x)$$
$$= -30 + 0.26(60)$$
$$= -30 + 15.6$$
$$\boxed{x = -14.4}$$

$$y = y_1 + t(m_y)$$
$$= 50 + 0.26(10)$$
$$= 50 + 2.6$$
$$\boxed{y = 52.6}$$

$$\Rightarrow \boxed{B = (-14.4, 52.6, 85)}$$

For A point

region code for A ⇒ 000001

$$t = \frac{x_{min} - x_1}{m_x} \quad ; \quad x = x_{min} = 0$$

$$\Rightarrow t = \frac{0 - (-30)}{60} = \frac{30}{60} = 1/2 = 0.5 //$$

$$y = y_1 + t(m_y)$$
$$= 50 + 0.5(10)$$
$$\boxed{y = 55}$$

$$z = z_1 + t(m_z)$$
$$= 72 + 0.5(50)$$
$$= 72 + 25$$
$$\boxed{z = 97}$$

$$\boxed{A = (0, 55, 97)}$$

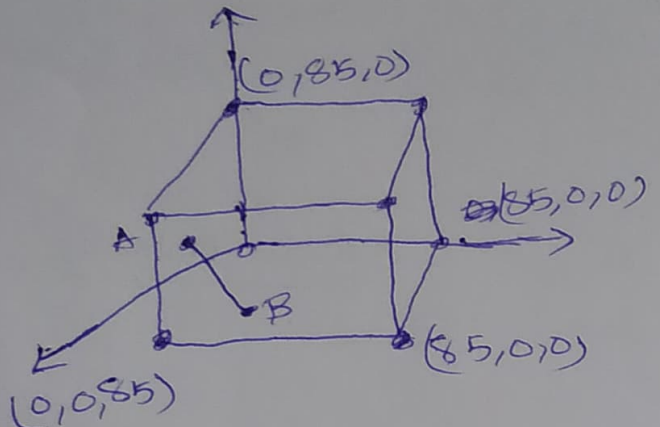
Region Code

(OR) A ⇒ 000000

B ⇒ 000000

000000 ⇒ passes trivial accept

⇒ Clipped line segment is



A = (0, 55, 97)

~~B = (6, 56, 85)~~

B = (-14.4, 52.6, 85)