Q1. implicit function : $\frac{x}{1} + \frac{y}{3} + \frac{z}{6} - 1 = 0$

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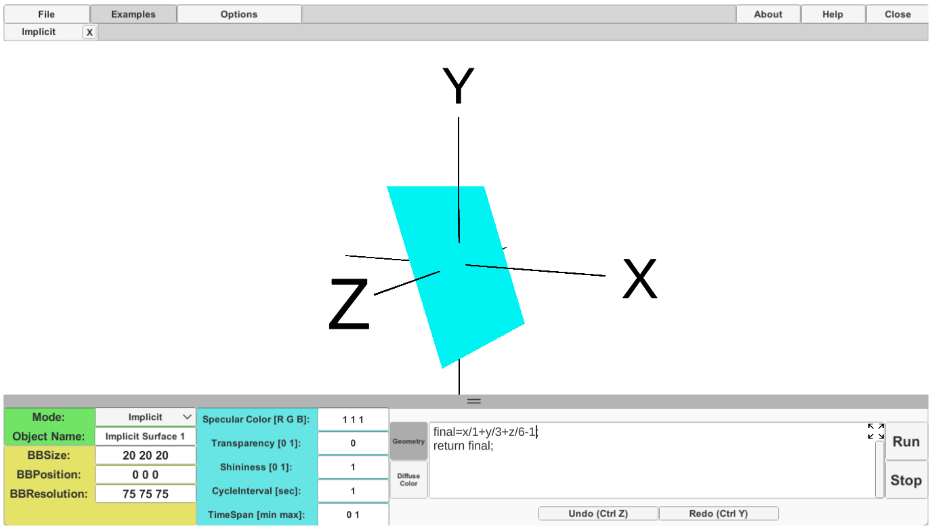


Q2 the orthogonal line pass through

$P_1(2,-1,1)$ $u=0$

$P_2(3,0,4)$ $u=1$

one of the vector that orthogonal to the plane

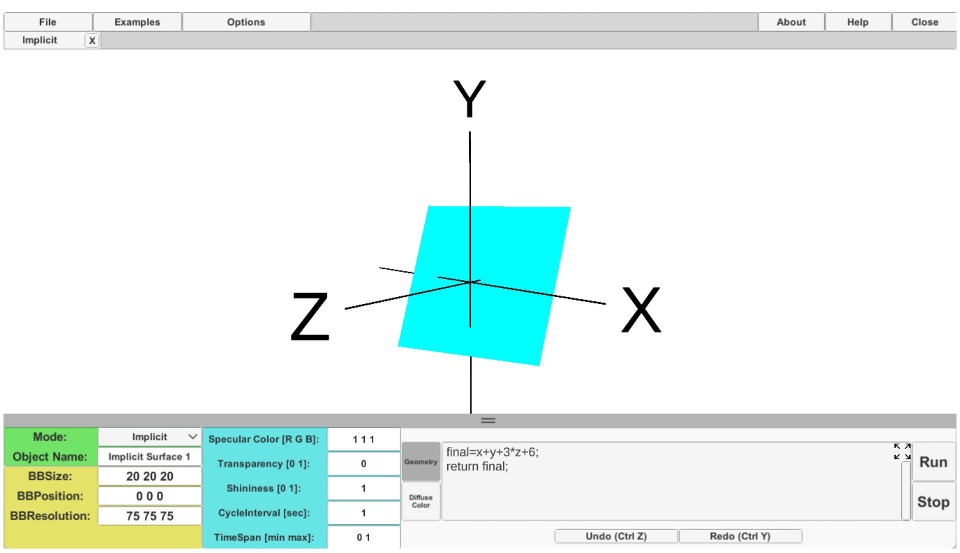
is $\vec{N} = P_2 - P_1 = (1,1,3)$

$\because$ the plane passes through $(1,2,-3)$

$\therefore$ the implicit function of the plane is

$1\cdot(x-1) + 1\cdot(y-2) + 3\cdot(z+3) = 0$

$\Rightarrow x+y+3z+6 = 0$



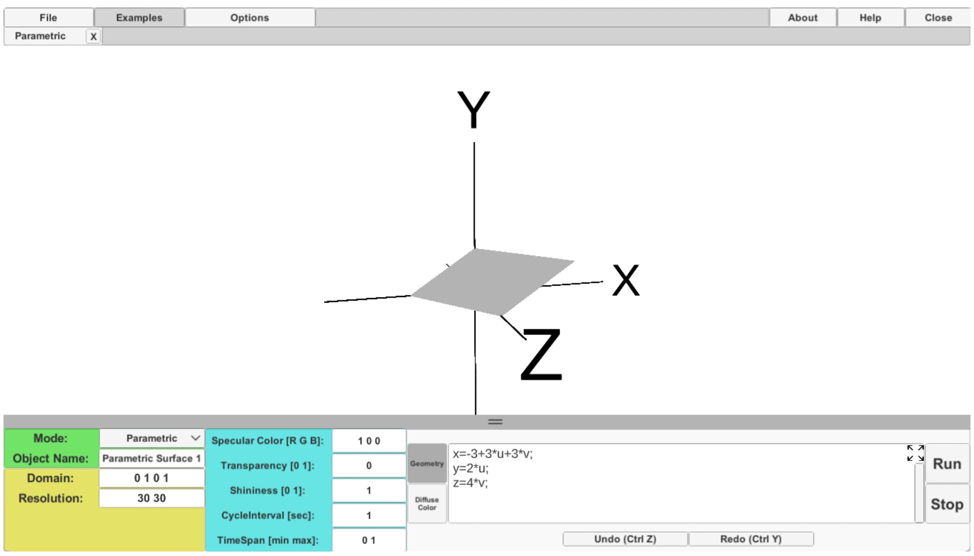
Q3 $P_1=(-3,0,0)$

$P_2=(0,2,0)$

$P_3=(0,0,4)$

Then $P=P_1+u(P_2-P_1)+v(P_3-P_1)$

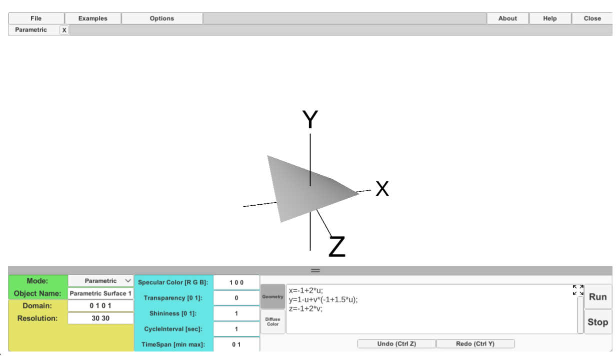
$$\begin{cases} x=-3+3u+3v \\ y=2u \\ z=4v \end{cases}$$



Q4 $P=P_1+u(P_2-P_1)+v(P_3-P_1+u(P_4-P_3-(P_2-P_1)))$

(a) $P=(-1,1,-1)+u(2,-1,0)+v((0,-1,2)+u(0,1.5,0))$

$$\begin{cases} x=-1+2u \\ y=1-u+v(-1+1.5u) \\ z=-1+2v \end{cases}$$



(b) $u=0.2,\ v=0.4$

$x=-1+0.4=-0.6$

$y=1-0.2+0.4(-1+0.3)=0.52$

$z=-1+0.8=-0.2$

$P_0=(-0.6,0.52,-0.2)$

Q5 We need to find the interpercetron of three lines

$$P_1: \begin{cases} 1+2u=3-t \\ 1+u=2+t \\ 1-u=4t \end{cases} \Rightarrow \begin{cases} u=1 \\ t=0 \end{cases} \Rightarrow P_1(3,2,0)$$

$$P_2: \begin{cases} 3-u=2-t \\ 2+u=3-2t \\ 4u=4-3t \end{cases} \Rightarrow \begin{cases} u=1 \\ t=0 \end{cases} \Rightarrow P_2(2,3,4)$$

$$P_3: \begin{cases} 1+2u=2-t \\ 1+u=3-2t \\ 1-u=4-3t \end{cases} \Rightarrow \begin{cases} u=0 \\ t=1 \end{cases} \Rightarrow P_3(1,1,1)$$

Suppose $P_4=P_3=(1,1,1)$

$$P=P_1+u(P_2-P_1)+v(P_3-P_1+u(P_4-P_3-(P_2-P_1)))$$

$$P=(3,2,0)+u(-1,1,4)+v((-2,-1,1)+u(1,-1,-4))$$

$$\begin{cases} x=3-u+v(-2+u) \\ y=2+u+v(-1-u) \\ z=4u+v(1-4u) \end{cases}$$