Donut math: how donut.c works

Jul 20, 2011

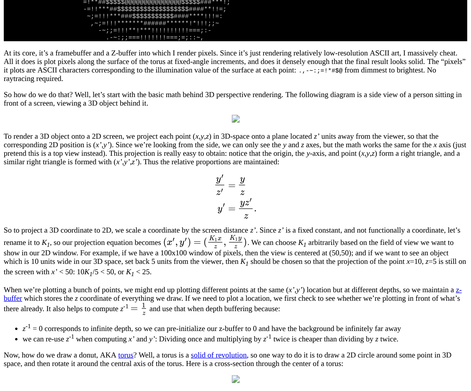
[**Update 1/13/2021**: I wrote a follow-up with some optimizations.]

There has been a sudden resurgence of interest in my "donut" code from 2006, and I've had a couple requests to explain this one. It's been five years now, so it's not exactly fresh in my memory, so I will reconstruct it from scratch, in great detail, and hopefully get approximately the same result.

This is the code:

```
            k;double sin()
         ,cos();main(){float A=
       0,B=0,i,j,z[1760];char b[
     1760];printf("\x1b[2J");for(;;)
  {memset(b,32,1760);memset(z,0,7040)
  ;for(j=0;6.28>j;j+=0.07)for(i=0;6.28
  >i;i+=0.02){float c=sin(i),d=cos(j),e=
  sin(A),f=sin(j),g=cos(A),h=d+2,D=1/(c*
  h*e+f*g+5),l=cos(B),m=sin
  in(B),t=c*h*g-f*        e;int x=40+30*D*
  (l*h*c+m*j,y=           12+15*D*(l*h*m
  +t*m),o=x+80*y,         N=8*((f*e-c*d*g
   )*m-c*d*e-f*g-l        *d*h));if(22>y&&
   y>0&&x>0&&80>x&&D>z[o]){z[o]=D;;;b[o]=
   ".,-:;=!*#$@"[N>0?N:0];}}/*****!!!!*/
   printf("\x1b[H";for(k=0;1761>k;k++)
    putchar(k%80?b[k]:10);A+=0.04;B+=
    0.02;}}/*****####*******!!=;:~
     ~:;==!!!**********!!!!===:;-
      .,~~;;;========;;;;:~-.
          ..,~------,.`
```

...and the output, animated in Javascript: toggle animation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