① Random midpoint displacement

take a midpoint of a line

displace the midpoint to the average of the endpoints y values plus a random offset

random # r = between $[r_{low}, r_{hi}]$

(2) Have a map
$z \mapsto 4z^2$

Fixpoints of this map are values where

$$z = 4z^2$$

$$\Rightarrow 4z^2 - z = 0$$

$$4z(z-1) = 0$$

$$\Rightarrow \boxed{z = 0 \text{ or } z = \tfrac{1}{4}}$$

Suppose $|z| = \frac{1}{4}$

That is, $z = \frac{1}{4}e^{i\theta}$ for some θ

Then $4z^2 = \frac{1}{4}e^{i2\theta}$

So points of this length rotate around circle of radius a 1/4 and neither diverge nor converge

Notice if $|z| < \frac{1}{4}$ then $|4z^2| < |z|$. So iterating will cause convergence to 0.

If $|z| > \frac{1}{4}$ then $|z| < |4z^2|$. So iterating will cause divergence.

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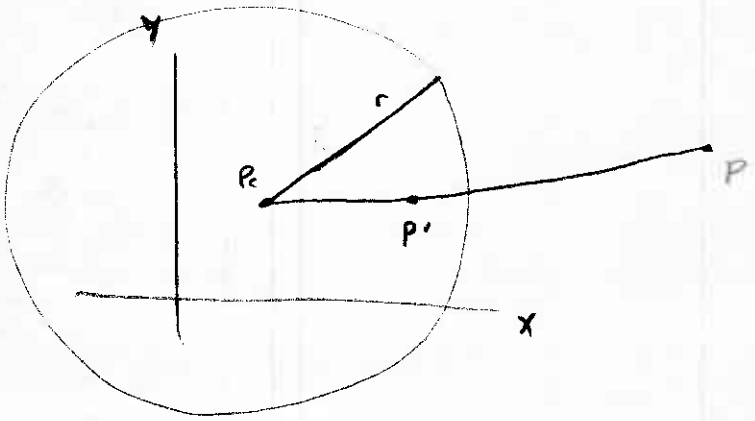
Jos4

3.) EXPLAIN SELF INVERSE FRACTALS

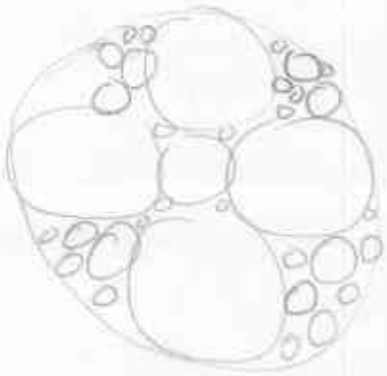
{ Book p. 506
LECTURE .ppt



INVERT P TO P'

TRANSFORMATION $(\overline{P_cP})(\overline{P_cP'}) = r^2$

1. USE AN INITIAL SET OF DIFFERENT CIRCLES
2. THEN YOU ITERATE, INVERTING THROUGH THE DIFFERENT CIRCLES, BOUNCING BETWEEN CIRCLES IN SEQUENCE.
3. YOU GET A PRETTY PICTURE.



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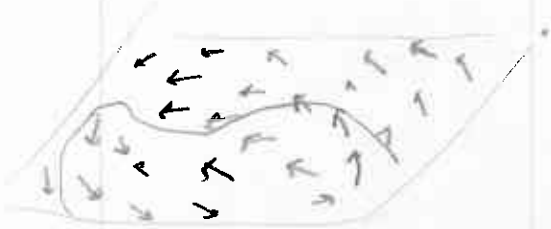
4.) VECTOR FIELD OF TEMPERATURE FLOW

* PLOT EACH DATA POINT AS A SMALL ARROW THAT SHOWS MAGNITUDE AND DIRECTION OF VECTOR.

* USE WITH CROSS-SECTIONAL SLICES.

* FIELD LINE/STREAMLINES CAN AUGMENT PLOT BY SHOWING THE OVERALL MOVEMENT OF VECTOR FIELD



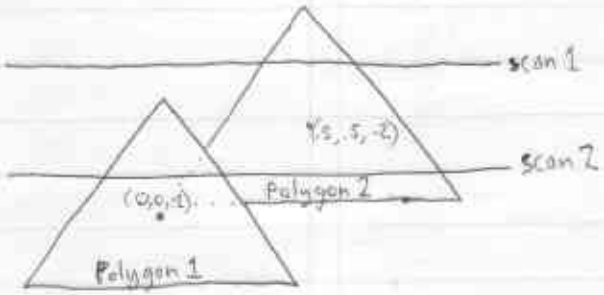
5&6

5. A-buffering allows a pixel to record all depth and color data associated with it. The Z-buffer method only allows 1 depth value per pixel, which can cause problems with non-opaque objects.

```
glCullFace(GL_BACK);
glEnable(GL_CULL_FACE);
```

↖ A buffer is better for transparent/translucent objects.

6.



- scan line 1 detects only polygon 2
- when scan line 2 detects both polygon 1 and polygon 2, it compares their Z-values and draws polygon 1, which is closer to the camera

7. Candle Light Source (local source) p. 561 in book

$a = 0.1 \quad b = 0.1 \quad c = 1$

$$f_{i,\text{radiation}} = \frac{1}{0.1 + 0.1d + 1d^2}$$

candle light is weak and does not light distant objects well

Moon Light Source (source at infinity)

$a = 1 \quad b = 0 \quad c = 0$

$$f_{i,\text{radiation}} = \frac{1}{1 + 0d + 0d^2} = 1.0$$

8. Briefly distinguish between the following: p. 567 in book

Ambient Lighting

general background lighting

Specular Reflection

Seen as highlights when an object reflects light, shiny objects. Specular reflection is ~~that component of light~~ that component of light transmitted from an object due to ~~reflection~~ intensity in a particular direction.

Diffuse Reflection

Light is scattered with equal intensity in all directions, dull objects

~~light is reflected in random direction.~~

Diffuse reflection is that component of light intensity reflected from an object in a random scattered way.

Marin Gouw
RK Tumuluri

9) glMaterial*(surfFace, surfProperty, propvalue)

surface - apply property to either front or back face or both of material (GL_FRONT, GL_BACK, GL_FRONT_AND_BACK)

surfProperty - GL_AMBIENT - ambient coefficient
- GL_DIFFUSE - diffuse coefficient
- GL_SPECULAR - specular coefficient
- GL_SHININESS - specular exponent, how concentrated the specular highlight is.

FinalColor = GL_AMBIENT * I + (GL_DIFFUSE * LightColor * (N·L)) * Id + GL_SPECULAR (N·H)^(GL_SHININESS) * Is

10) Luminance is the perceived Intensity of light from ~~value of~~ an object. To humans, the green wavelength ~~is more~~ is perceived most.

- Gamma Correction applies to correcting the Non-linear based CRT emmissions to a linear intensity model