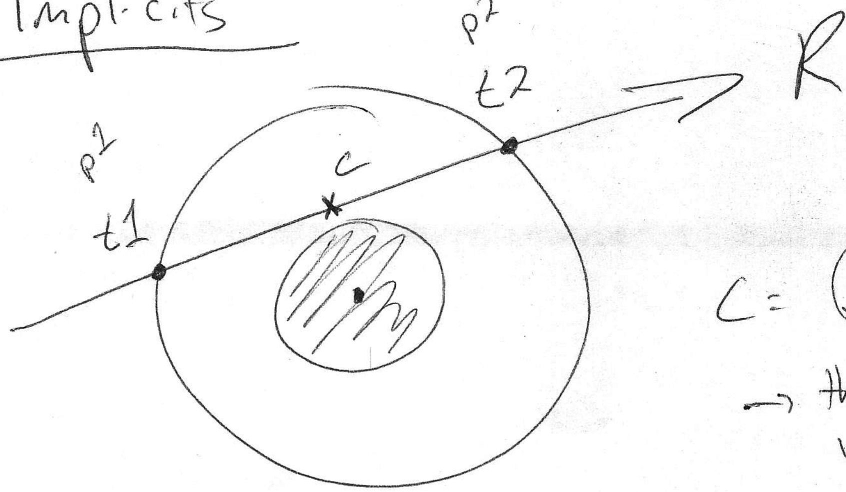
Implicits



$C = (p1 + p2)/2$

→ this is where biggest field value will exist

→ sphereIntersect → get t1 & t2 → get p1 & p2

→ get c.

→ if field (c) < 0.5 return nohit.

```
↳ {  double sum = 0;
     for (int i = 0; i < implicits.size(); i++)
          sum += implicits[i].fieldat(p);
     return sum;
  }
```

- ~~Assume~~ if field (p1) > 0.5 return nohit
  // we're already in the surface!

~~temp = p field~~

```
p = p1;   int i = 0;
while( abs( field (p) - 0.5) > 0.001)
{
      m = (p + c) / 2;
      if ( field(p) < 0.5)
            p = m;
      else
            c = m;
      i++
      if (i > 1000)  { exit(-1); }
} //end while
return m as point of intersection
```

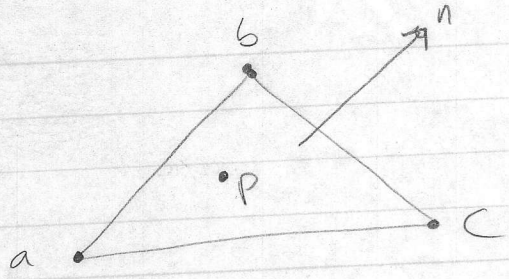
- Post midterm Rida chat Baycentric!

```
implicit :: getNormal ( Point p)
{
        const epsilon = 0.05;
        double f = field (p);
        Point normal;
        normal.x = (field (Point (p.x + epsilon, p.y, p.z)) - f) / epsilon;
        normal.y = (field (Point (p.x, p.y + epsilon, p.z)) - f) / epsilon;
        normal.z = (field (Point (p.x, p.y, p.z + epsilon)) - f) / epsilon;
        return normal / normal.length();
}


double field ( Point p)
{
        const double IA = -4.0/9.0;
        const double IB = 17.0/9.0;
        const double IC = -22.0/9.0;

        double f = 0;
        double r;
        for (int i=0; i < implicits.size(); i++)
        {
                r = distanceSquared (p, implicits[i].center);
                r /= implicits[i].radius * implicits[i].radius;
                if (r > 1) continue
                f += (1.0 + r * (IC + r * (IB + r * IA)))
                if (f > 1) return 1
        } // end for
        return f;
}
```

Triangle Intersect



// normal of triangle (plane)

$n = (b-a) \times (b-c)$

// for any point in plane

$n \cdot (p-b) = (b-a) \times (b-c) \cdot (p-b) = \phi$

→ angle between plane & normal is 90°

// point of intersection for the ray is

$p = u + vt$

& sub into the plane equation

$n \cdot (u + vt - b) = 0$

$t = n \cdot (b-u) / n \cdot v$

So t is our distance to the triangle, but do we intersect?

if $n \cdot v = 0$, we're parallel to the triangle

test if we're inside the triangle using cross product

$(b-a) \times (p-a) \cdot n$

$(c-b) \times (p-b) \cdot n$

$(a-c) \times (p-c) \cdot n$

all must have the same sign.