ELIPSE
Obtencion de posicion y velocidad a aprtir de elementos orbitales.
Curso Mecanica Celeste 2005. Tabare Gallardo.

unidad de tiempo = dia
unidad de distancia = ua
unidad de masa = sol

```
M := 1.0
m := 0.0009548
kgauss := 0.01720209895
μ := kgauss * kgauss * (M + m)
a := 5.179995814935037
e := 0.04871959170445102
i := 1.3046833201072958 * Pi / 180
ω := -84.90588389067327 * Pi / 180
Ω := 100.48313071118518 * Pi / 180
T := -81.299453540603
t := 0.0
```

- **Esta kepler me la paso Daniel Chagas.**

```
kepler[tt_, ϵ_, mm_] :=
 Module[{lista = {}, ee = tt}, For[j = 1, j ≤ mm, j++,
   ee = tt + ϵ * Sin[ee]; lista = Append[lista, ee]]; Return[lista]]
```

$$n := \sqrt{\frac{\mu}{a^3}}$$

```
p := a * (1 - e * e)
h := √(p * μ)
```

```
AM1 = n * (t - T)

0.118681
```

```
AM = Mod[AM1, 2 * Pi]
```

```
0.118681
```

```
kepler[AM, e, 20]
```

```
{0.12445, 0.124729, 0.124742, 0.124743, 0.124743,
 0.124743, 0.124743, 0.124743, 0.124743, 0.124743,
 0.124743, 0.124743, 0.124743, 0.124743, 0.124743,
 0.124743, 0.124743, 0.124743, 0.124743, 0.124743}
```

```
AE = Last[%]
```

```
0.124743
```

```
r = a * (1 - e * Cos[AE])
```

```
4.92959
```

$$\theta := \text{Sign}[AE] * \text{ArcCos}\left[\frac{p / r - 1}{e}\right]$$

```
{r, θ}
```

```
{4.92959, 0.130959}
```

```
ξ := r * Cos[θ]
η := r * Sin[θ]
ζ := 0
```

```
vecpos := {ξ, η, ζ}
```

```
xp := -h / p * Sin[θ]
yp := h / p * (e + Cos[θ])
zp := 0
```

```
vecvel := {xp, yp, zp}
```

```
P1={{Cos[ω],-Sin[ω],0},{Sin[ω],Cos[ω],0},{0,0,1}};
```

```
P2={{1,0,0},{0,Cos[i],-Sin[i]},{0,Sin[i],Cos[i]}};
```

```
P3={{Cos[Ω],-Sin[Ω],0},{Sin[Ω],Cos[Ω],0},{0,0,1}};
```

```
P=P3.P2.P1;
```

```
veclipos = P.vecpos
```

```
{4.53377, 1.9323, -0.10954}
```

```
veclivel = P.vecvel
```

```
{-0.00306656, 0.00732014, 0.0000383417}
```

```
veclivel * 365.25
```

```
{-1.12006, 2.67368, 0.0140043}
```