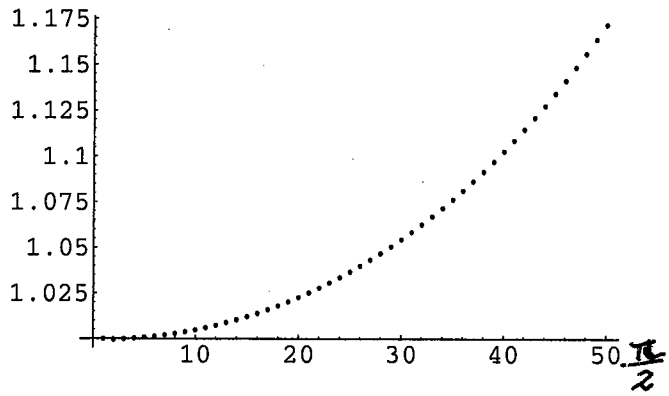
```
In[28]:= i = 1;
         t0 = 0.;
         f[1] = π / Sqrt[2];
         nstep = 50;
         del = π / 2 / nstep;
         Do[{t0 = t0 + del,
         f0 = Integrate[1. / Sqrt[Cos[t] - Cos[t0]], {t, 0.0, t0 - 0.00000001}],
           i = i + 1,
           f[i] = f0}, {nstep}]

In[29]:= ListPlot[Table[Sqrt[2] / π f[j], {j, nstep}]]
```




```
Out[29]= - Graphics -
```

$$T_0 = \frac{2\pi}{\omega} = 2\pi\sqrt{\frac{l}{g}}$$

$$T = 4\sqrt{\frac{l}{g}}\int_0^{\theta_0}\frac{d\theta}{\sqrt{\cos\theta - \cos\theta_0}}$$

$$T/T_0 = \frac{\sqrt{2}}{\pi}\int_0^{\theta_0}\frac{d\theta}{\sqrt{\cos\theta - \cos\theta_0}}$$

$$\int_{\delta}^{L} \frac{x}{\sqrt{x^3-\delta^3}}\,dx = \sqrt{\frac{29}{3}}\,t$$

$$y = x - \delta$$

$$\int_{0}^{L-\delta} \frac{y+\delta}{\sqrt{3\delta^2 y + 3\delta y^2 + y^3}}\,dy$$

$$z = y/\delta$$

$$\int_{0}^{\frac{L}{\delta}-1} \frac{z+1}{\sqrt{3z+3z^2+z^3}}\,dz = \frac{1}{\sqrt{\delta}}\sqrt{\frac{29}{3}}\,t$$

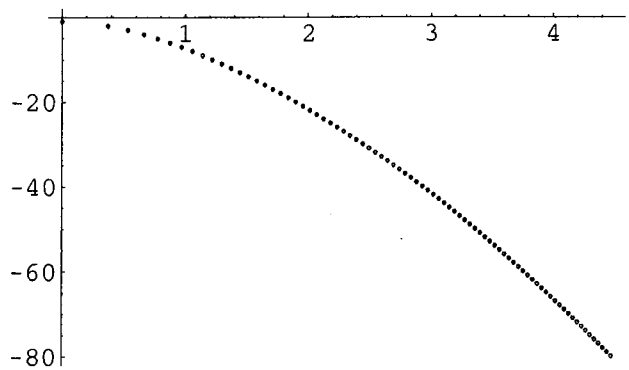
numerical integration as a function of upper limit

```
In[1]:= nstep = 80;
        a = 0;
        i = 1;
        f[i] = 0;

In[2]:= Do[{a = a + 0.1,
          f0 = NIntegrate[(z + 1) / Sqrt[3 z + 3 z^2 + z^3], {z, 0, a}],
          i = i + 1,
          f[i] = f0},
         {nstep}]
```

f[i] proportional to time, i proportional to distance

```
In[4]:= ListPlot[Table[{f[i], -i}, {i, nstep}] ]
```




```
Out[4]= - Graphics -
```