

**PHYSICS 502**  
**1<sup>st</sup> HOMEWORK**  
**Dr. V. Lempesis**

**Hand in: Sunday 3<sup>rd</sup> March 2013**

1. The evaporation from a particular spherical drop of liquid (constant density) is proportional to its surface area. Assuming this to be the sole mechanism of mass loss, find the radius of the drop as a function of time.
2. Find the Fourier series representation of

$$f(x) = \begin{cases} 0, & -\pi < x < 0 \\ x, & 0 \leq x < \pi \end{cases}, \text{ period } 2\pi$$

From your Fourier series show that

$$\frac{\pi^2}{8} = 1 + \frac{1}{3^2} + \frac{1}{5^2} + \dots$$

3. Find the complex Fourier series of the rectified sine wave periodic functions defined by

$$f(t) = A \sin \pi t, \quad 0 < t < 1, \quad \text{period } 1.$$