

All parts of this homework to be completed in Maple should be done in a single worksheet. You can submit either the worksheet by email or a printout of it with your homework.

1. Oprea 1.4.10
2. Oprea 1.4.14 (Maple ok, but not required)
3. Oprea 1.5.2 (You'll have to read the paragraph just prior to understand the question.)
4. Oprea 1.5.3
5. Write a procedure in Maple that takes two arguments, a curve  $\alpha(t)$  and the name of the parameter  $(t)$  and returns a list containing the following:

$$[v(t), \kappa(t), \tau(t), T(t), N(t), B(t)].$$

The procedure should attempt to create expressions that are as simple as possible. Demonstrate that your procedure works by applying it to the circular helix  $\alpha(t) = (a \cos(t), a \sin(t), bt)$ .

6. Use your procedure from the previous problem to assist you in answering Oprea 1.5.4 and 1.5.5.
7. Apply the isoperimetric inequality to the ellipse

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1.$$