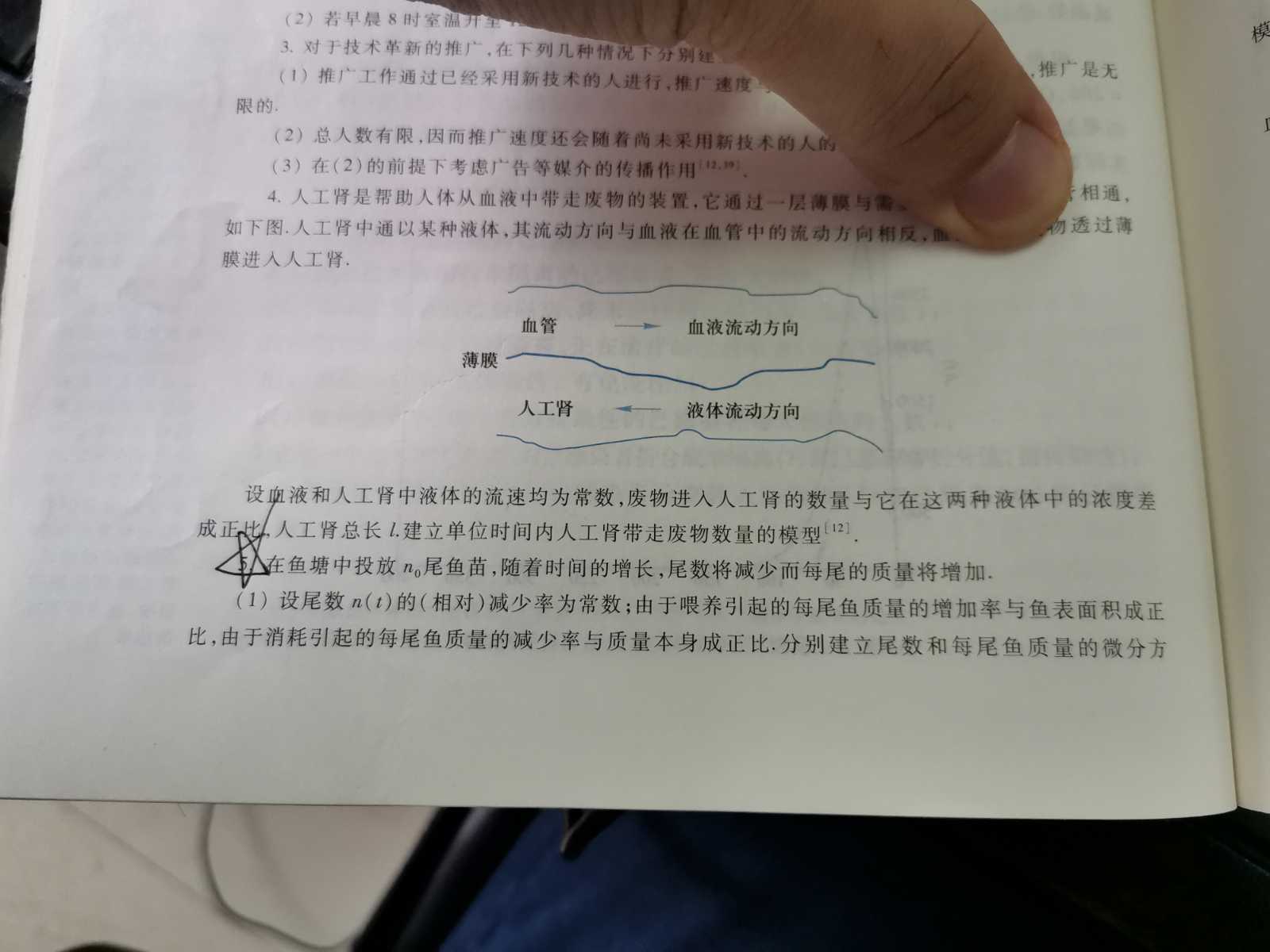
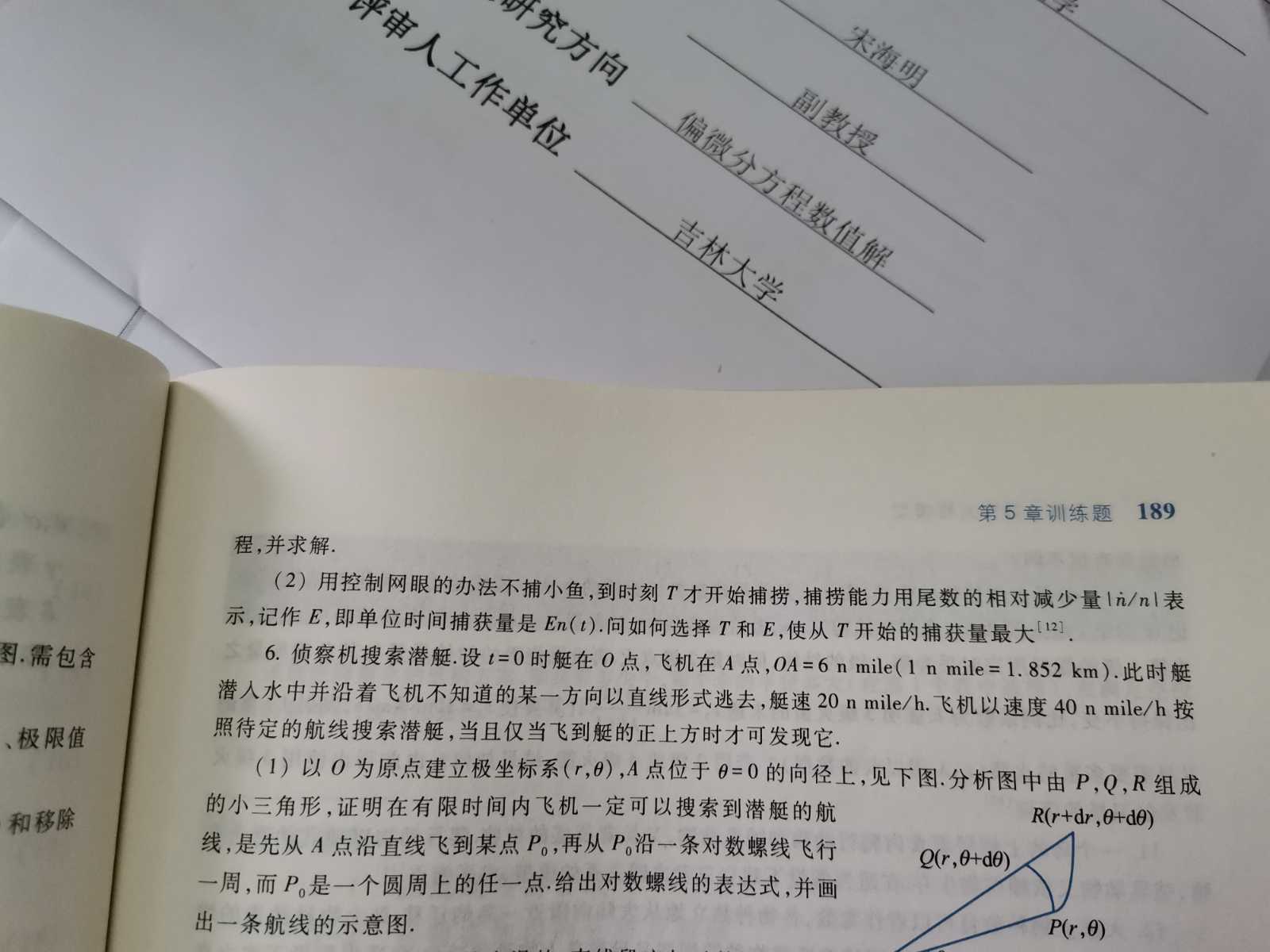
Modeling hw3

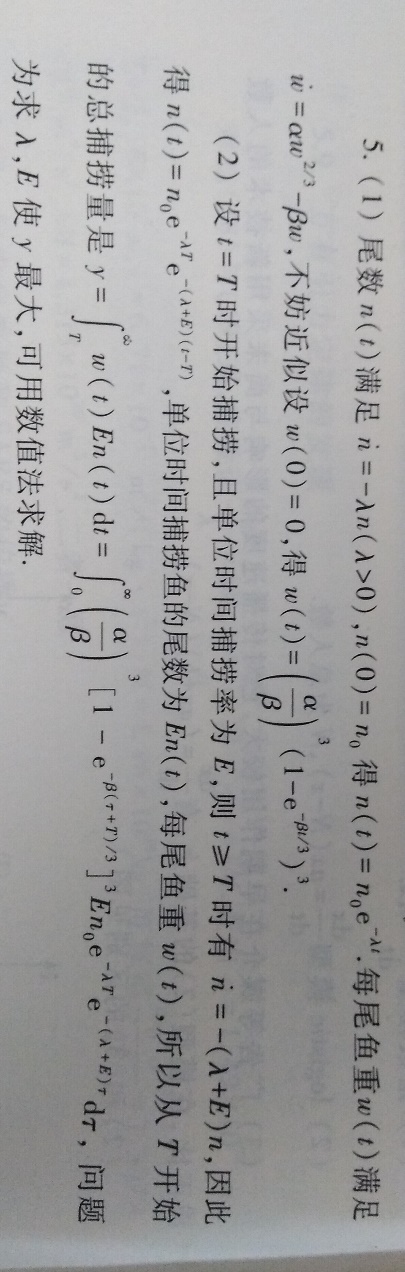
10170437 Mark Taylor

# **Problems**





# **Solution**



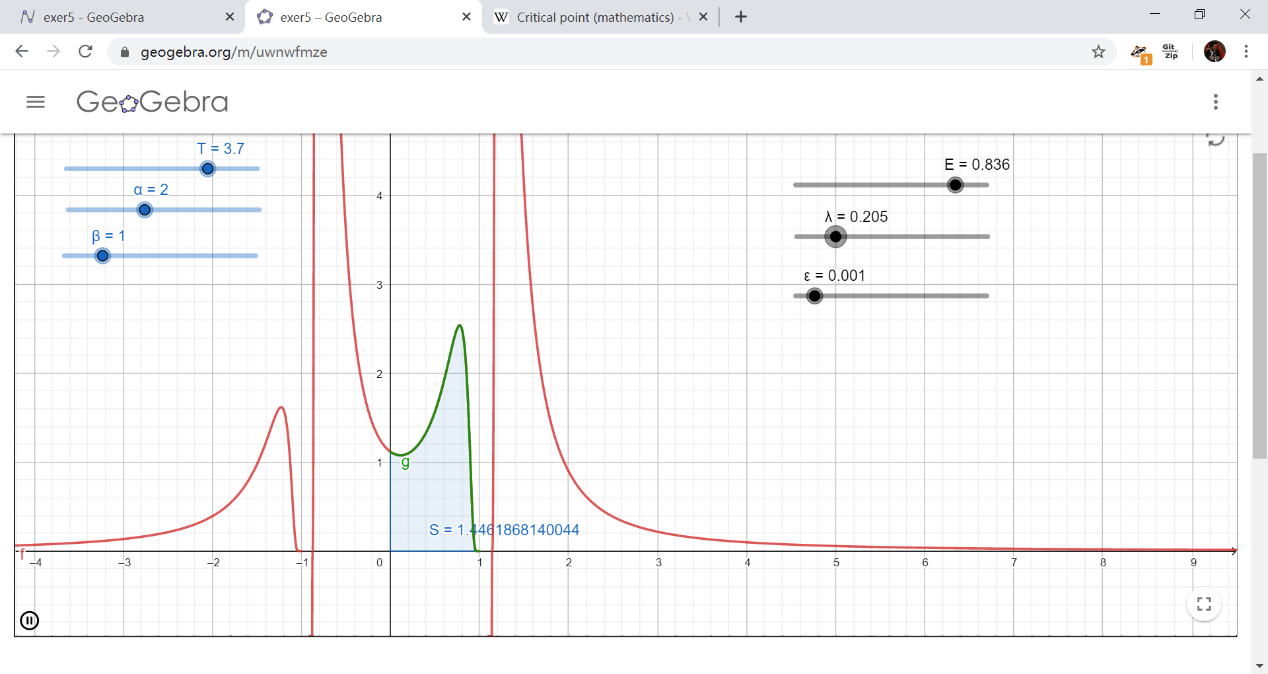
Okay, now let’s try to figure out how to numerically solve this problem.

Let , , , thus

Then we need to find out the critical point such that .

## Visualization

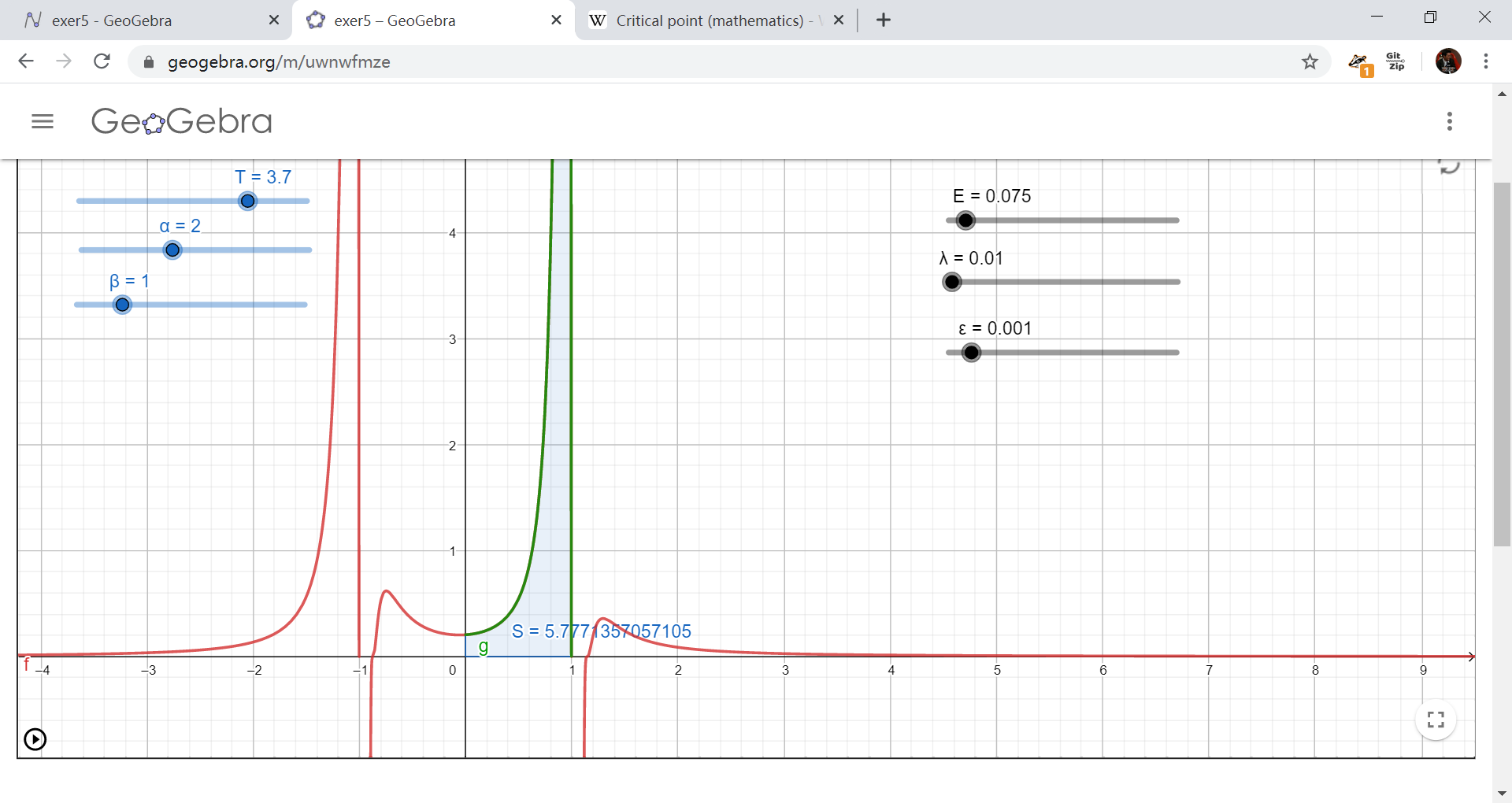
See <https://www.geogebra.org/m/uwnwfmze> for the dynamic graph.



In this graph, is the goal function to be integrated, i.e.

Note that we omit the positive constant , for it has no contribution to the critical point.

The blue sliders are constants as well, you can set those as you like. Since is a discontinuous point, we can only numerically integrate by interval , you can set the as well at the right side of the graph.

Apparently, , and decays as increases (you can verify it by dragging slider and keeping the rest static). In practical terms, is the rate of decrement of fry number that as time goes on (as they grow). The smaller is, the more fry will remain. Reasonable.

The critical point might be under the conditions that

We can also approximate the critical point by writing a simple MATLAB program, letting and be two vectors, consisting of a series of (evenly spaced) elements, say *linspace(0,1,100)*. Afterwards, get the maximum numerical integral by Simpson’s method or Gaussian quadrature formula, and return this pair of values.