Question 3

Spring 2014

1. One is **Gauss-Laguerre** quadrature method since it is suitable for semi-infinite domain.

   Let $t = \frac{x}{1-x}$,then

$$I(f) = f\int_0^1 \left[\exp\left(-\frac{x}{1-x}\right) erf\left(\sqrt{\frac{x}{1-x}}\right)\right]^{f-1} \frac{dx}{(1-x)^2}$$

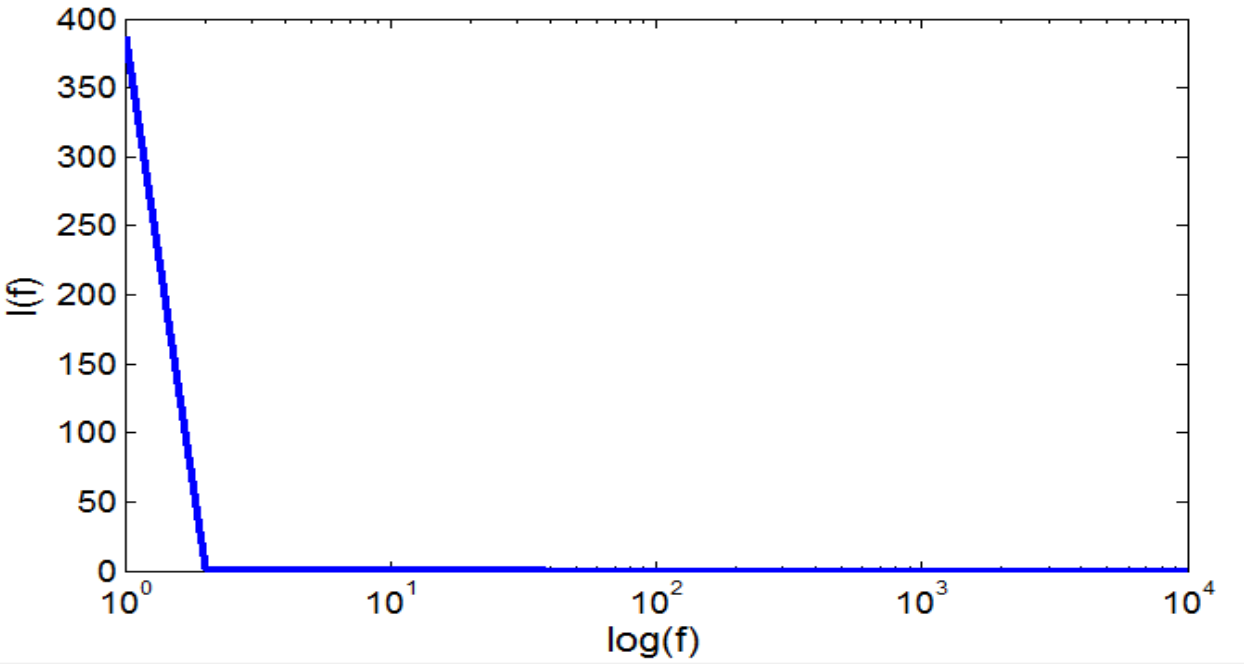
   Then we can use **Gauss-Legendre** method to evaluate this integral.

Advantages and disadvantages

Gauss-Legendre vs **Gauss-Laguerre**

The former is easier to get the weights and abscissas, but slower convergence rate than the latter. The former is more suitable for finite domain, but the latter is more suitable for semi-infinite domain. For this problem, the former need deal with the singularity.

2. Use **Gauss-Laguerre**, the plot is shown below (order = 100).



3. The Least-squares B-spline approximation to find the functional form. The plot is shown below (order=3)