1 Definitions

Let these be functions:

$f(x,t) : I \times \mathbb{R}_0^+ \to \mathbb{R}_0^+$

$h(a,b) : I \times I \to \mathbb{R}_0^+$

$r(x,v) : I \times \mathbb{R}_0^+ \to \mathbb{R}_0^+$

$s(x) : I \to \mathbb{R}_0^+$

where I is the unit interval $[0,1]$

Define these functions:

$T(b,t) = \int_0^b h(x,b)\, r(x, f(x,t))\, dx$

$g(x,t) = \frac{\partial f(x,t)}{\partial t}$

$u(t) = \int_0^1 s(x)\, f(x,t)\, dx$

2 Objective

Given: $f(x,0)$, h, r, s, $q \in \mathbb{R}_0^+$

Maximize: $f(1,q)$

Constraint: $u(t) = \int_0^1 \frac{g(x,t)}{T(x,t)}\, dx$

3 Instance

Consider the instance:

$f(x,0) = 1$

$s(x) = e^{jx}$, $j = 3$

$h(a,b) = e^{ka(a-b)}$, $k = 9$

$r(x,v) = v^{1-x}$

$T(b,t) = \int_0^b e^{kx(x-b)}\, f(x,t)^{1-x}\, dx$

$u(t) = \int_0^1 e^{jx}\, f(x,t)\, dx$