BEE 4750/5750 Homework 1

Ian Shen-Costello (iys2)

2022-09-13

Problem 1

Problem 1.1

```
julia> using GraphRecipes, Plots

julia> A = [0 1 1 1;
            0 0 0 1;
            0 0 0 1;
            0 0 0 0]
4×4 Matrix{Int64}:
 0  1  1  1
 0  0  0  1
 0  0  0  1
 0  0  0  0

julia> names = ["Cheap", "Land Treatment", "Chem Treatment", "Pristine Brook"]
4-element Vector{String}:
 "Cheap"
 "Land Treatment"
 "Chem Treatment"
 "Pristine Brook"

julia> shapes=[:hexagon, :rect, :rect, :hexagon]
4-element Vector{Symbol}:
 :hexagon
 :rect
 :rect
 :hexagon

julia> xpos = [0, -1, -0.25, 1]
4-element Vector{Float64}:
  0.0
 -1.0
 -0.25
  1.0

julia> ypos = [1, 0, 0, -1]
4-element Vector{Int64}:
  1
  0
```

```
  0
 -1
```

```
julia> graphplot(A, names=names, edgelabel = edgelabel, markersize=0.15,
markershapes=shapes, markercolor=:white, x=xpos, y=ypos)
Error: UndefVarError: edgelabel not defined
```

Problem 1.2

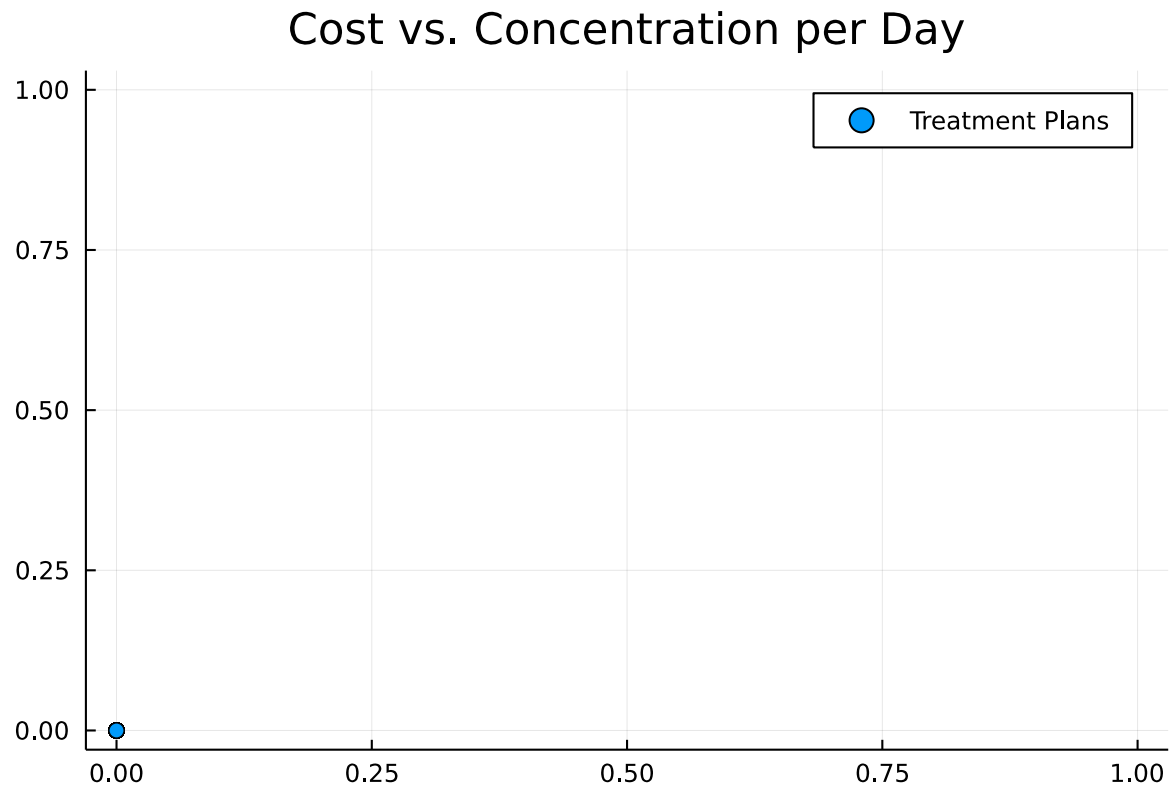
Problem 1.3

```
julia> function yuk(x1, x2)
                cost = (x1^2)/20 + 1.5*x2
                if cost < 0
                        cost = 0
                end
                conc = 100 - x1*0.8 - x2*(1-x2*0.005)

                return cost, conc
        end
yuk (generic function with 1 method)
```

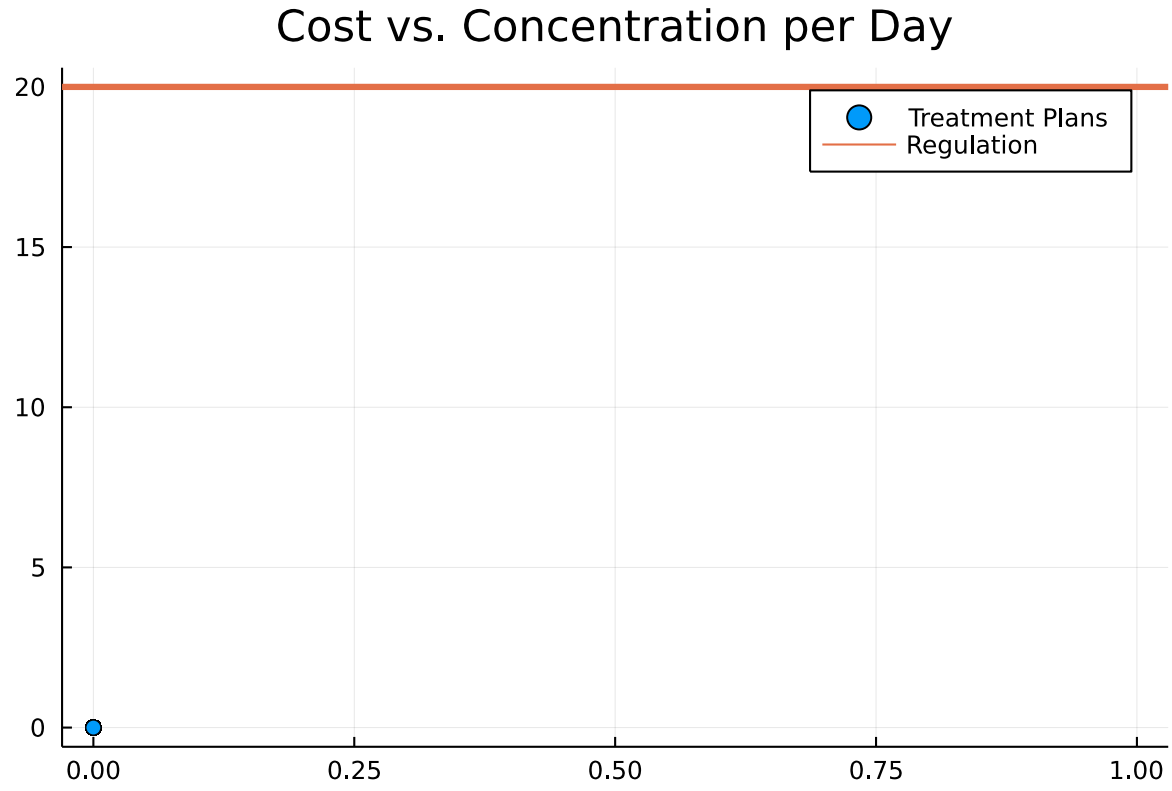
Problem 1.4

```
julia> using Plots

julia> #Initialize arrays
       conc = zeros(5151)
5151-element Vector{Float64}:
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0
 ⋮
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0

julia> cost = zeros(5151)
5151-element Vector{Float64}:
```

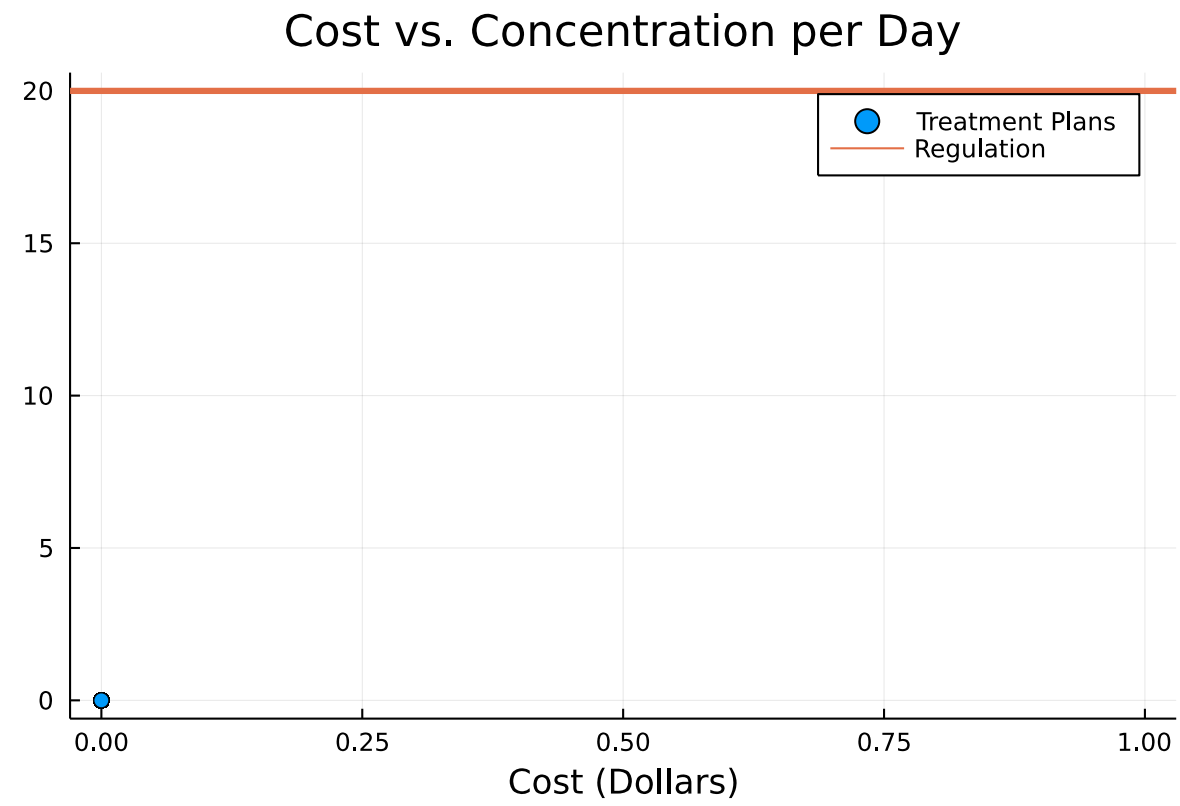
```
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0
 ⋮
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0
 0.0

julia> #Initialize index
       count = 1
1

julia> for i = 0:100
        for j = 0:100-i
                conc[count] = yuk(i , j)[2]
                cost[count] = yuk(i, j)[1]
                count = count+1
        end
       end
Error: UndefVarError: count not defined

julia> #Plot cost vs. conc showing regulation cutoff
       scatter(cost,conc,title = "Cost vs. Concentration per Day", label =
"Treatment Plans")
```



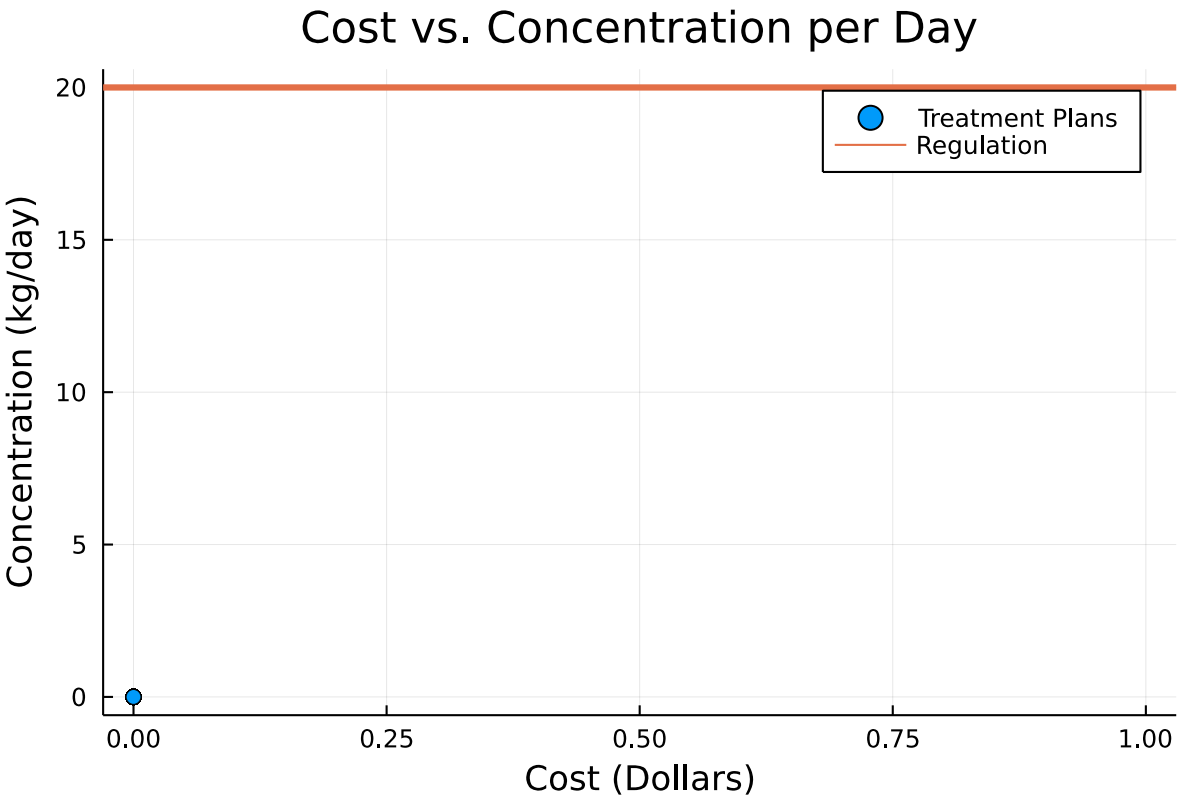

```
julia> hline!([20], width = 3,label = "Regulation")
```




```
julia> xlabel!("Cost (Dollars)")
```

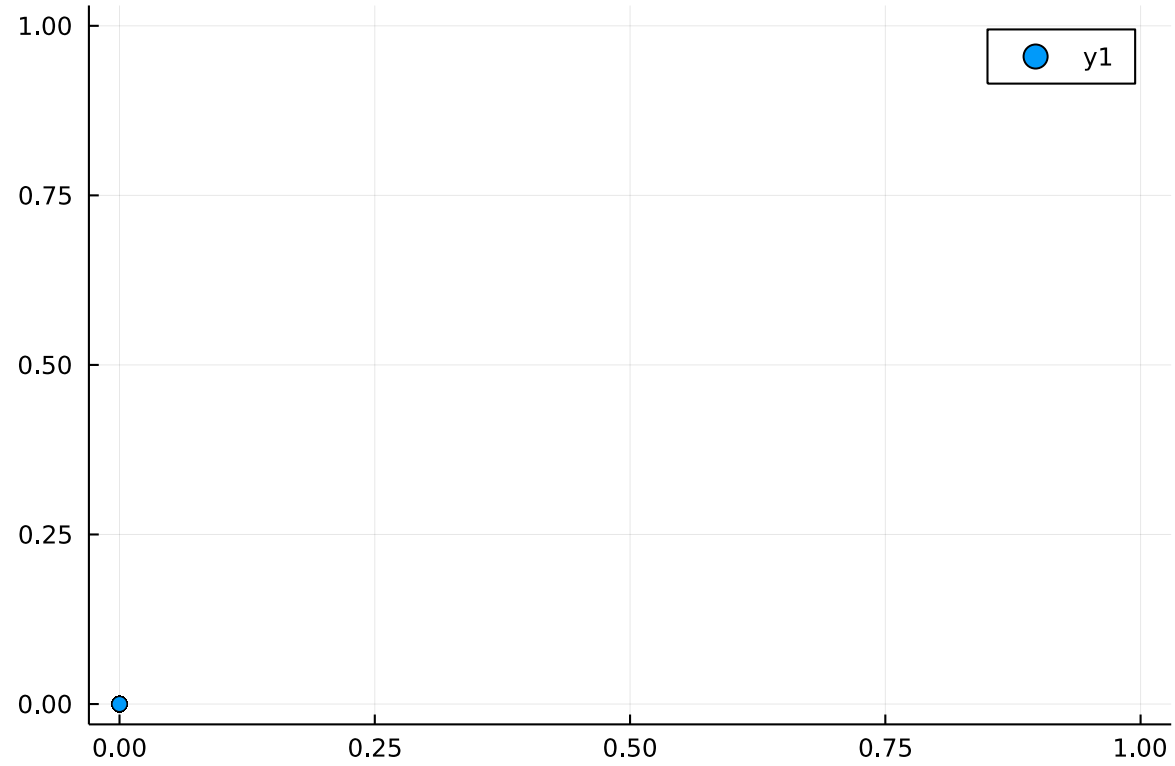



```
julia> ylabel!("Concentration (kg/day)")
```




```
julia> conc_new = []
Any[]

julia> cost_new =[]
Any[]
```

```
julia> for i = 1:length(conc)
        if conc[i] <= 20
                append!( conc_new, conc[i] )
                append!( cost_new, cost[i] )
        end
       end

julia> scatter(cost_new,conc_new)
```




```
julia> conc[60]
0.0
```

Problem 1.5

Problem 1.6

Problem 1.7

References