

# Kolmogorov Backward Equations

Ashutosh Bharambe

July 1, 2020

```
using Flux, StochasticDiffEq
using NeuralNetDiffEq
using Plots
using CuArrays
using CUDAnative
```

## 0.1 Introduction on Backward Kolmogorov Equations

The backward Kolmogorov Equation deals with a terminal condition. The one dimensional backward kolmogorov equation that we are going to deal with is of the form :

$$\frac{\partial p}{\partial t} = -\mu(x) \frac{\partial p}{\partial x} - \frac{1}{2} \sigma^2(x) \frac{\partial^2 p}{\partial x^2}, \quad p(T, x) = \varphi(x)$$

for all  $t \in [0, T]$  and for all  $x \in \mathbb{R}^d$

**The Black Scholes Model** The Black-Scholes Model governs the price evolution of the European put or call option. In the below equation  $V$  is the price of some derivative,  $S$  is the Stock Price,  $r$  is the risk free interest rate and  $\sigma$  the volatility of the stock returns. The payoff at a time  $T$  is known to us. And this makes it a terminal PDE. In case of an European put option the PDE is:

$$\frac{\partial V}{\partial t} + rS \frac{\partial V}{\partial S} + \frac{1}{2} \sigma^2 S^2 \frac{\partial^2 V}{\partial S^2} - rV = 0, \quad V(T, S) = \max\{K - S, 0\}$$

for all  $t \in [0, T]$  and for all  $S \in \mathbb{R}^d$

In order to make the above equation in the form of the Backward - Kolmogorov PDE we should substitute

$$V(S, t) = e^{r(t-T)} p(S, t)$$

and thus we get

$$e^{r(t-T)} \frac{\partial p}{\partial t} + r e^{r(t-T)} p(S, t) = -\mu(x) \frac{\partial p}{\partial x} e^{r(t-T)} - \frac{1}{2} \sigma^2(x) \frac{\partial^2 p}{\partial x^2} e^{r(t-T)} + r e^{r(t-T)} p(S, t)$$

And the terminal condition

$$p(S, T) = \max\{\mathcal{K} - x, 0\}$$

We will train our model and the model itself will be the solution of the equation

## 0.2 Defining the problem and the solver

We should start defining the terminal condition for our equation:

```
function phi(xi)
    y = Float64[]
    K = 100
    for x in eachcol(xi)
        val = max(K - maximum(x) , 0.00)
        y = push!(y , val)
    end
    y = reshape(y , 1 , size(y)[1] )
    return y
end
```

phi (generic function with 1 method)

Now we shall define the problem : We will define the  $\sigma$  and  $\mu$  by comparing it to the original equation. The xspan is the span of initial stock prices.

```
d = 1
r = 0.02
sigma = 0.4
xspan = (80.00 , 115.0)
tspan = (0.0 , 1.0)
σ(du , u , p , t) = du .= sigma.*u
μ(du , u , p , t) = du .= r.*u
prob = KolmogorovPDEProblem(μ , σ , phi , xspan , tspan, d)
```

```
KolmogorovPDEProblem
timespan: (0.0, 1.0)xspan: (80.0, 115.0)μ
Main.##WeaveSandBox#563.μSigma
Main.##WeaveSandBox#563.σ
```

Now once we have defined our problem it is necessary to define the parameters for the solver.

```
sdealg = EM()
ensemblealg = EnsembleThreads()
dt = 0.01
dx = 0.001
trajectories = 100000

100000
```

Now lets define our model m and the optimiser

```
m = Chain(Dense(d, 8, leakyrelu),Dense(8, 16, leakyrelu),Dense(16 , 8 , leakyrelu) ,
Dense(8 , 1))
use_gpu = false
if CUDAactive.functional() == true
    m = fmap(CuArrays.cu , m)
    use_gpu = true
end
opt = Flux.ADAM(0.01)
```

```
Flux.Optimise.ADAM(0.01, (0.9, 0.999), IdDict{Any,Any}())
```

And then finally call the solver

```
@time sol = solve(prob, NeuralNetDiffEq.NNKolmogorov(m, opt, sdealg, ensemblealg),  
verbose = true, dt = dt,  
          dx = dx , trajectories = trajectories , abstol=1e-6, maxiters = 4200 ,  
use_gpu = use_gpu)
```

```
Current loss is: 649.8197  
Current loss is: 417.09387  
Current loss is: 420.175  
Current loss is: 510.62982  
Current loss is: 496.33444  
Current loss is: 429.98462  
Current loss is: 389.63736  
Current loss is: 403.10974  
Current loss is: 436.83734  
Current loss is: 446.00934  
Current loss is: 425.9386  
Current loss is: 399.70074  
Current loss is: 388.29523  
Current loss is: 395.15955  
Current loss is: 408.62515  
Current loss is: 415.09018  
Current loss is: 409.8649  
Current loss is: 398.37936  
Current loss is: 389.6438  
Current loss is: 388.9376  
Current loss is: 394.57126  
Current loss is: 400.30127  
Current loss is: 401.01398  
Current loss is: 396.57327  
Current loss is: 390.9202  
Current loss is: 388.19467  
Current loss is: 389.53796  
Current loss is: 392.79745  
Current loss is: 394.78732  
Current loss is: 393.918  
Current loss is: 391.11536  
Current loss is: 388.66034  
Current loss is: 388.20172  
Current loss is: 389.56076  
Current loss is: 391.14655  
Current loss is: 391.46262  
Current loss is: 390.32126  
Current loss is: 388.77908  
Current loss is: 388.05008  
Current loss is: 388.4748  
Current loss is: 389.38763  
Current loss is: 389.84152  
Current loss is: 389.44583  
Current loss is: 388.60114  
Current loss is: 388.03058  
Current loss is: 388.10922  
Current loss is: 388.59183  
Current loss is: 388.92255  
Current loss is: 388.77768  
Current loss is: 388.31784  
Current loss is: 387.96432
```

Current loss is: 387.97342  
Current loss is: 388.2308  
Current loss is: 388.41766  
Current loss is: 388.33746  
Current loss is: 388.07687  
Current loss is: 387.87906  
Current loss is: 387.88934  
Current loss is: 388.03287  
Current loss is: 388.1207  
Current loss is: 388.05124  
Current loss is: 387.89484  
Current loss is: 387.79648  
Current loss is: 387.81982  
Current loss is: 387.8982  
Current loss is: 387.92224  
Current loss is: 387.85687  
Current loss is: 387.76395  
Current loss is: 387.72372  
Current loss is: 387.74927  
Current loss is: 387.784  
Current loss is: 387.7719  
Current loss is: 387.71606  
Current loss is: 387.66562  
Current loss is: 387.6557  
Current loss is: 387.67255  
Current loss is: 387.67642  
Current loss is: 387.64862  
Current loss is: 387.60828  
Current loss is: 387.58502  
Current loss is: 387.58484  
Current loss is: 387.58728  
Current loss is: 387.57263  
Current loss is: 387.5438  
Current loss is: 387.51926  
Current loss is: 387.5094  
Current loss is: 387.50623  
Current loss is: 387.49554  
Current loss is: 387.47424  
Current loss is: 387.45203  
Current loss is: 387.43802  
Current loss is: 387.43015  
Current loss is: 387.41946  
Current loss is: 387.40192  
Current loss is: 387.38226  
Current loss is: 387.3669  
Current loss is: 387.3559  
Current loss is: 387.34412  
Current loss is: 387.32812  
Current loss is: 387.31024  
Current loss is: 387.29456  
Current loss is: 387.28174  
Current loss is: 387.2688  
Current loss is: 387.25314  
Current loss is: 387.23624  
Current loss is: 387.22055  
Current loss is: 387.20663  
Current loss is: 387.19263  
Current loss is: 387.17694  
Current loss is: 387.16055

Current loss is: 387.14484  
Current loss is: 387.1301  
Current loss is: 387.11526  
Current loss is: 387.09943  
Current loss is: 387.0831  
Current loss is: 387.06726  
Current loss is: 387.052  
Current loss is: 387.0365  
Current loss is: 387.02042  
Current loss is: 387.00403  
Current loss is: 386.98798  
Current loss is: 386.97223  
Current loss is: 386.95624  
Current loss is: 386.9398  
Current loss is: 386.9233  
Current loss is: 386.90698  
Current loss is: 386.89075  
Current loss is: 386.8743  
Current loss is: 386.85764  
Current loss is: 386.84088  
Current loss is: 386.82422  
Current loss is: 386.80762  
Current loss is: 386.79074  
Current loss is: 386.77374  
Current loss is: 386.75674  
Current loss is: 386.73978  
Current loss is: 386.72272  
Current loss is: 386.7055  
Current loss is: 386.68814  
Current loss is: 386.67096  
Current loss is: 386.6536  
Current loss is: 386.63614  
Current loss is: 386.6186  
Current loss is: 386.60098  
Current loss is: 386.58334  
Current loss is: 386.56567  
Current loss is: 386.54788  
Current loss is: 386.53003  
Current loss is: 386.5121  
Current loss is: 386.4941  
Current loss is: 386.47604  
Current loss is: 386.45792  
Current loss is: 386.43967  
Current loss is: 386.42142  
Current loss is: 386.4031  
Current loss is: 386.38467  
Current loss is: 386.36618  
Current loss is: 386.34763  
Current loss is: 386.32904  
Current loss is: 386.31036  
Current loss is: 386.2916  
Current loss is: 386.2728  
Current loss is: 386.2539  
Current loss is: 386.23495  
Current loss is: 386.2159  
Current loss is: 386.19678  
Current loss is: 386.17755  
Current loss is: 386.1584  
Current loss is: 386.13904

Current loss is: 386.11966  
Current loss is: 386.10022  
Current loss is: 386.08066  
Current loss is: 386.06107  
Current loss is: 386.04138  
Current loss is: 386.02164  
Current loss is: 386.00183  
Current loss is: 385.98187  
Current loss is: 385.96194  
Current loss is: 385.94193  
Current loss is: 385.92178  
Current loss is: 385.90155  
Current loss is: 385.88132  
Current loss is: 385.861  
Current loss is: 385.84055  
Current loss is: 385.82004  
Current loss is: 385.7995  
Current loss is: 385.77884  
Current loss is: 385.75815  
Current loss is: 385.7374  
Current loss is: 385.71652  
Current loss is: 385.6956  
Current loss is: 385.67456  
Current loss is: 385.65347  
Current loss is: 385.63232  
Current loss is: 385.61102  
Current loss is: 385.58972  
Current loss is: 385.5683  
Current loss is: 385.54684  
Current loss is: 385.52524  
Current loss is: 385.50354  
Current loss is: 385.48184  
Current loss is: 385.46008  
Current loss is: 385.43814  
Current loss is: 385.41614  
Current loss is: 385.3941  
Current loss is: 385.37198  
Current loss is: 385.3498  
Current loss is: 385.3275  
Current loss is: 385.30508  
Current loss is: 385.28262  
Current loss is: 385.26007  
Current loss is: 385.23743  
Current loss is: 385.21472  
Current loss is: 385.19183  
Current loss is: 385.16898  
Current loss is: 385.146  
Current loss is: 385.12292  
Current loss is: 385.0997  
Current loss is: 385.0765  
Current loss is: 385.0532  
Current loss is: 385.02975  
Current loss is: 385.0062  
Current loss is: 384.9826  
Current loss is: 384.95892  
Current loss is: 384.93506  
Current loss is: 384.9112  
Current loss is: 384.88724  
Current loss is: 384.86316

Current loss is: 384.83896  
Current loss is: 384.8147  
Current loss is: 384.7903  
Current loss is: 384.76587  
Current loss is: 384.74127  
Current loss is: 384.71667  
Current loss is: 384.69193  
Current loss is: 384.66708  
Current loss is: 384.64212  
Current loss is: 384.61703  
Current loss is: 384.59186  
Current loss is: 384.56662  
Current loss is: 384.54126  
Current loss is: 384.51584  
Current loss is: 384.49023  
Current loss is: 384.46454  
Current loss is: 384.43875  
Current loss is: 384.41287  
Current loss is: 384.38687  
Current loss is: 384.36078  
Current loss is: 384.33456  
Current loss is: 384.30823  
Current loss is: 384.28183  
Current loss is: 384.25528  
Current loss is: 384.22858  
Current loss is: 384.20178  
Current loss is: 384.17487  
Current loss is: 384.14792  
Current loss is: 384.1208  
Current loss is: 384.09354  
Current loss is: 384.06616  
Current loss is: 384.03867  
Current loss is: 384.01108  
Current loss is: 383.98334  
Current loss is: 383.95547  
Current loss is: 383.92752  
Current loss is: 383.89938  
Current loss is: 383.8712  
Current loss is: 383.8428  
Current loss is: 383.8144  
Current loss is: 383.7857  
Current loss is: 383.757  
Current loss is: 383.72803  
Current loss is: 383.69907  
Current loss is: 383.66992  
Current loss is: 383.64066  
Current loss is: 383.61124  
Current loss is: 383.58167  
Current loss is: 383.55194  
Current loss is: 383.52216  
Current loss is: 383.49216  
Current loss is: 383.46204  
Current loss is: 383.43176  
Current loss is: 383.4013  
Current loss is: 383.3707  
Current loss is: 383.34003  
Current loss is: 383.30914  
Current loss is: 383.2782  
Current loss is: 383.24698

Current loss is: 383.21564  
Current loss is: 383.18414  
Current loss is: 383.1525  
Current loss is: 383.1207  
Current loss is: 383.08875  
Current loss is: 383.05664  
Current loss is: 383.02432  
Current loss is: 382.99188  
Current loss is: 382.95926  
Current loss is: 382.92648  
Current loss is: 382.89352  
Current loss is: 382.86035  
Current loss is: 382.82703  
Current loss is: 382.79355  
Current loss is: 382.75983  
Current loss is: 382.72598  
Current loss is: 382.69196  
Current loss is: 382.65775  
Current loss is: 382.62332  
Current loss is: 382.5887  
Current loss is: 382.55392  
Current loss is: 382.51895  
Current loss is: 382.48383  
Current loss is: 382.44843  
Current loss is: 382.41287  
Current loss is: 382.37708  
Current loss is: 382.34113  
Current loss is: 382.30496  
Current loss is: 382.26855  
Current loss is: 382.23196  
Current loss is: 382.1951  
Current loss is: 382.15814  
Current loss is: 382.12088  
Current loss is: 382.08344  
Current loss is: 382.04572  
Current loss is: 382.00778  
Current loss is: 381.96967  
Current loss is: 381.9313  
Current loss is: 381.89276  
Current loss is: 381.8539  
Current loss is: 381.81488  
Current loss is: 381.77554  
Current loss is: 381.736  
Current loss is: 381.69614  
Current loss is: 381.65616  
Current loss is: 381.61584  
Current loss is: 381.57532  
Current loss is: 381.53455  
Current loss is: 381.49344  
Current loss is: 381.45215  
Current loss is: 381.41055  
Current loss is: 381.36868  
Current loss is: 381.3265  
Current loss is: 381.28412  
Current loss is: 381.24142  
Current loss is: 381.19846  
Current loss is: 381.15518  
Current loss is: 381.11163  
Current loss is: 381.06784



Current loss is: 381.02368  
Current loss is: 380.97928  
Current loss is: 380.93448  
Current loss is: 380.88947  
Current loss is: 380.84412  
Current loss is: 380.79846  
Current loss is: 380.75247  
Current loss is: 380.70615  
Current loss is: 380.65955  
Current loss is: 380.61255  
Current loss is: 380.56528  
Current loss is: 380.51764  
Current loss is: 380.46967  
Current loss is: 380.4213  
Current loss is: 380.37268  
Current loss is: 380.32364  
Current loss is: 380.27423  
Current loss is: 380.22452  
Current loss is: 380.17435  
Current loss is: 380.1239  
Current loss is: 380.07303  
Current loss is: 380.02176  
Current loss is: 379.97012  
Current loss is: 379.91806  
Current loss is: 379.86566  
Current loss is: 379.81284  
Current loss is: 379.75958  
Current loss is: 379.706  
Current loss is: 379.65186  
Current loss is: 379.59735  
Current loss is: 379.54248  
Current loss is: 379.48712  
Current loss is: 379.43134  
Current loss is: 379.37506  
Current loss is: 379.3184  
Current loss is: 379.26126  
Current loss is: 379.20367  
Current loss is: 379.1456  
Current loss is: 379.08707  
Current loss is: 379.02805  
Current loss is: 378.9685  
Current loss is: 378.90854  
Current loss is: 378.848  
Current loss is: 378.78702  
Current loss is: 378.72552  
Current loss is: 378.6635  
Current loss is: 378.60086  
Current loss is: 378.53787  
Current loss is: 378.47418  
Current loss is: 378.41003  
Current loss is: 378.34534  
Current loss is: 378.28003  
Current loss is: 378.2142  
Current loss is: 378.14774  
Current loss is: 378.08072  
Current loss is: 378.01315  
Current loss is: 377.94495  
Current loss is: 377.8762  
Current loss is: 377.8068

Current loss is: 377.73672  
Current loss is: 377.6661  
Current loss is: 377.5948  
Current loss is: 377.52286  
Current loss is: 377.45032  
Current loss is: 377.37704  
Current loss is: 377.3031  
Current loss is: 377.22855  
Current loss is: 377.15326  
Current loss is: 377.07727  
Current loss is: 377.00058  
Current loss is: 376.92322  
Current loss is: 376.84512  
Current loss is: 376.76627  
Current loss is: 376.68665  
Current loss is: 376.60632  
Current loss is: 376.52524  
Current loss is: 376.44336  
Current loss is: 376.36072  
Current loss is: 376.27728  
Current loss is: 376.19308  
Current loss is: 376.10803  
Current loss is: 376.02216  
Current loss is: 375.93546  
Current loss is: 375.8479  
Current loss is: 375.75958  
Current loss is: 375.67035  
Current loss is: 375.58023  
Current loss is: 375.48926  
Current loss is: 375.39734  
Current loss is: 375.30463  
Current loss is: 375.21094  
Current loss is: 375.11627  
Current loss is: 375.02072  
Current loss is: 374.92426  
Current loss is: 374.82678  
Current loss is: 374.7284  
Current loss is: 374.62894  
Current loss is: 374.5286  
Current loss is: 374.4272  
Current loss is: 374.32474  
Current loss is: 374.22134  
Current loss is: 374.11682  
Current loss is: 374.01132  
Current loss is: 373.90475  
Current loss is: 373.79706  
Current loss is: 373.68832  
Current loss is: 373.57846  
Current loss is: 373.4675  
Current loss is: 373.35547  
Current loss is: 373.24228  
Current loss is: 373.12787  
Current loss is: 373.0124  
Current loss is: 372.89575  
Current loss is: 372.77792  
Current loss is: 372.65887  
Current loss is: 372.53864  
Current loss is: 372.4172  
Current loss is: 372.29453

Current loss is: 372.17062  
Current loss is: 372.04547  
Current loss is: 371.91898  
Current loss is: 371.79138  
Current loss is: 371.66238  
Current loss is: 371.5322  
Current loss is: 371.40063  
Current loss is: 371.2677  
Current loss is: 371.13358  
Current loss is: 370.99802  
Current loss is: 370.86118  
Current loss is: 370.723  
Current loss is: 370.58344  
Current loss is: 370.44254  
Current loss is: 370.3002  
Current loss is: 370.15652  
Current loss is: 370.01144  
Current loss is: 369.865  
Current loss is: 369.71707  
Current loss is: 369.56775  
Current loss is: 369.41702  
Current loss is: 369.26492  
Current loss is: 369.1113  
Current loss is: 368.9563  
Current loss is: 368.7999  
Current loss is: 368.642  
Current loss is: 368.48267  
Current loss is: 368.32187  
Current loss is: 368.1597  
Current loss is: 367.996  
Current loss is: 367.83087  
Current loss is: 367.6643  
Current loss is: 367.4963  
Current loss is: 367.32687  
Current loss is: 367.156  
Current loss is: 366.9837  
Current loss is: 366.80994  
Current loss is: 366.63483  
Current loss is: 366.45822  
Current loss is: 366.2803  
Current loss is: 366.10123  
Current loss is: 365.92203  
Current loss is: 365.74866  
Current loss is: 365.61832  
Current loss is: 365.7907  
Current loss is: 368.23108  
Current loss is: 381.35233  
Current loss is: 406.88736  
Current loss is: 390.44955  
Current loss is: 365.22958  
Current loss is: 391.2352  
Current loss is: 375.03952  
Current loss is: 370.5744  
Current loss is: 383.32556  
Current loss is: 364.53763  
Current loss is: 378.91876  
Current loss is: 367.9532  
Current loss is: 371.1882  
Current loss is: 371.62808

Current loss is: 366.04935  
Current loss is: 372.5871  
Current loss is: 364.2137  
Current loss is: 371.25592  
Current loss is: 364.43878  
Current loss is: 368.88675  
Current loss is: 365.409  
Current loss is: 366.48874  
Current loss is: 366.2585  
Current loss is: 364.65833  
Current loss is: 366.56488  
Current loss is: 363.61935  
Current loss is: 366.2163  
Current loss is: 363.31598  
Current loss is: 365.3283  
Current loss is: 363.50534  
Current loss is: 364.19064  
Current loss is: 363.83084  
Current loss is: 363.16464  
Current loss is: 363.92923  
Current loss is: 362.54858  
Current loss is: 363.58472  
Current loss is: 362.41867  
Current loss is: 362.86334  
Current loss is: 362.546  
Current loss is: 362.10886  
Current loss is: 362.52167  
Current loss is: 361.69452  
Current loss is: 362.09592  
Current loss is: 361.6599  
Current loss is: 361.4591  
Current loss is: 361.6222  
Current loss is: 361.05835  
Current loss is: 361.23242  
Current loss is: 360.99026  
Current loss is: 360.69815  
Current loss is: 360.8257  
Current loss is: 360.4556  
Current loss is: 360.35876  
Current loss is: 360.35052  
Current loss is: 360.0125  
Current loss is: 359.97092  
Current loss is: 359.8891  
Current loss is: 359.60342  
Current loss is: 359.5487  
Current loss is: 359.45486  
Current loss is: 359.205  
Current loss is: 359.111  
Current loss is: 359.03397  
Current loss is: 358.81958  
Current loss is: 358.67267  
Current loss is: 358.6039  
Current loss is: 358.44772  
Current loss is: 358.26086  
Current loss is: 358.15378  
Current loss is: 358.05664  
Current loss is: 357.89615  
Current loss is: 357.7303  
Current loss is: 357.61432

Current loss is: 357.51187  
Current loss is: 357.37558  
Current loss is: 357.21762  
Current loss is: 357.07608  
Current loss is: 356.9604  
Current loss is: 356.8508  
Current loss is: 356.7285  
Current loss is: 356.59167  
Current loss is: 356.45032  
Current loss is: 356.3136  
Current loss is: 356.18515  
Current loss is: 356.06412  
Current loss is: 355.94867  
Current loss is: 355.83875  
Current loss is: 355.73737  
Current loss is: 355.65387  
Current loss is: 355.6112  
Current loss is: 355.66852  
Current loss is: 355.98447  
Current loss is: 357.00027  
Current loss is: 359.94116  
Current loss is: 367.76672  
Current loss is: 384.58292  
Current loss is: 401.52768  
Current loss is: 380.3  
Current loss is: 355.42017  
Current loss is: 373.21243  
Current loss is: 374.1326  
Current loss is: 355.4381  
Current loss is: 368.48688  
Current loss is: 366.6843  
Current loss is: 355.51874  
Current loss is: 366.90564  
Current loss is: 360.0702  
Current loss is: 357.2267  
Current loss is: 364.27438  
Current loss is: 355.95242  
Current loss is: 359.45755  
Current loss is: 360.1841  
Current loss is: 355.1355  
Current loss is: 360.0613  
Current loss is: 356.5493  
Current loss is: 356.25284  
Current loss is: 358.60947  
Current loss is: 354.8776  
Current loss is: 357.15167  
Current loss is: 356.4824  
Current loss is: 354.8328  
Current loss is: 356.92984  
Current loss is: 354.97958  
Current loss is: 355.22144  
Current loss is: 356.01407  
Current loss is: 354.33032  
Current loss is: 355.31512  
Current loss is: 355.0707  
Current loss is: 354.13773  
Current loss is: 355.0578  
Current loss is: 354.38974  
Current loss is: 354.03116

Current loss is: 354.64676  
Current loss is: 353.94998  
Current loss is: 353.86432  
Current loss is: 354.23306  
Current loss is: 353.64862  
Current loss is: 353.63046  
Current loss is: 353.86786  
Current loss is: 353.41434  
Current loss is: 353.36136  
Current loss is: 353.54495  
Current loss is: 353.21695  
Current loss is: 353.0886  
Current loss is: 353.23932  
Current loss is: 353.04288  
Current loss is: 352.84244  
Current loss is: 352.93054  
Current loss is: 352.8692  
Current loss is: 352.65094  
Current loss is: 352.6268  
Current loss is: 352.65555  
Current loss is: 352.51224  
Current loss is: 352.3794  
Current loss is: 352.38477  
Current loss is: 352.35846  
Current loss is: 352.22806  
Current loss is: 352.13266  
Current loss is: 352.12158  
Current loss is: 352.08826  
Current loss is: 351.9878  
Current loss is: 351.89575  
Current loss is: 351.85995  
Current loss is: 351.83514  
Current loss is: 351.77194  
Current loss is: 351.68558  
Current loss is: 351.61935  
Current loss is: 351.58276  
Current loss is: 351.55008  
Current loss is: 351.49863  
Current loss is: 351.43143  
Current loss is: 351.3664  
Current loss is: 351.31555  
Current loss is: 351.27728  
Current loss is: 351.24194  
Current loss is: 351.20163  
Current loss is: 351.1543  
Current loss is: 351.10272  
Current loss is: 351.05087  
Current loss is: 351.00162  
Current loss is: 350.9561  
Current loss is: 350.91412  
Current loss is: 350.87503  
Current loss is: 350.83838  
Current loss is: 350.80432  
Current loss is: 350.7736  
Current loss is: 350.7486  
Current loss is: 350.73428  
Current loss is: 350.74164  
Current loss is: 350.79526  
Current loss is: 350.9526

Current loss is: 351.35083  
Current loss is: 352.32535  
Current loss is: 354.68152  
Current loss is: 360.22104  
Current loss is: 371.9126  
Current loss is: 390.11548  
Current loss is: 399.54068  
Current loss is: 377.7544  
Current loss is: 351.4009  
Current loss is: 362.0527  
Current loss is: 376.98764  
Current loss is: 359.8772  
Current loss is: 351.8812  
Current loss is: 366.59622  
Current loss is: 360.3613  
Current loss is: 350.7634  
Current loss is: 361.09995  
Current loss is: 357.7155  
Current loss is: 350.80066  
Current loss is: 358.45352  
Current loss is: 354.89764  
Current loss is: 351.1374  
Current loss is: 356.74792  
Current loss is: 352.68762  
Current loss is: 351.6773  
Current loss is: 355.203  
Current loss is: 351.30054  
Current loss is: 352.1747  
Current loss is: 353.7034  
Current loss is: 350.67984  
Current loss is: 352.39398  
Current loss is: 352.40887  
Current loss is: 350.57178  
Current loss is: 352.27872  
Current loss is: 351.46487  
Current loss is: 350.67523  
Current loss is: 351.9371  
Current loss is: 350.88324  
Current loss is: 350.7793  
Current loss is: 351.52396  
Current loss is: 350.5723  
Current loss is: 350.80035  
Current loss is: 351.1488  
Current loss is: 350.41702  
Current loss is: 350.741  
Current loss is: 350.85468  
Current loss is: 350.33148  
Current loss is: 350.63428  
Current loss is: 350.63986  
Current loss is: 350.26935  
Current loss is: 350.51038  
Current loss is: 350.485  
Current loss is: 350.21283  
Current loss is: 350.38727  
Current loss is: 350.36963  
Current loss is: 350.15884  
Current loss is: 350.27246  
Current loss is: 350.2778  
Current loss is: 350.1093

Current loss is: 350.16867  
Current loss is: 350.19788  
Current loss is: 350.06647  
Current loss is: 350.0775  
Current loss is: 350.12198  
Current loss is: 350.03012  
Current loss is: 350.0016  
Current loss is: 350.04587  
Current loss is: 349.99646  
Current loss is: 349.94363  
Current loss is: 349.97015  
Current loss is: 349.95886  
Current loss is: 349.9036  
Current loss is: 349.90118  
Current loss is: 349.91162  
Current loss is: 349.87488  
Current loss is: 349.84766  
Current loss is: 349.85602  
Current loss is: 349.84525  
Current loss is: 349.81274  
Current loss is: 349.80298  
Current loss is: 349.80542  
Current loss is: 349.78726  
Current loss is: 349.76456  
Current loss is: 349.75992  
Current loss is: 349.7567  
Current loss is: 349.73944  
Current loss is: 349.7231  
Current loss is: 349.7186  
Current loss is: 349.71332  
Current loss is: 349.699  
Current loss is: 349.68588  
Current loss is: 349.6804  
Current loss is: 349.675  
Current loss is: 349.66382  
Current loss is: 349.6524  
Current loss is: 349.646  
Current loss is: 349.641  
Current loss is: 349.63263  
Current loss is: 349.62274  
Current loss is: 349.6155  
Current loss is: 349.61057  
Current loss is: 349.60452  
Current loss is: 349.59656  
Current loss is: 349.5891  
Current loss is: 349.58356  
Current loss is: 349.5787  
Current loss is: 349.5729  
Current loss is: 349.5663  
Current loss is: 349.56036  
Current loss is: 349.5555  
Current loss is: 349.5511  
Current loss is: 349.54602  
Current loss is: 349.54068  
Current loss is: 349.53555  
Current loss is: 349.53116  
Current loss is: 349.52716  
Current loss is: 349.52304  
Current loss is: 349.51868



Current loss is: 349.51434  
Current loss is: 349.51035  
Current loss is: 349.50674  
Current loss is: 349.50333  
Current loss is: 349.49982  
Current loss is: 349.49625  
Current loss is: 349.49274  
Current loss is: 349.48947  
Current loss is: 349.4864  
Current loss is: 349.48352  
Current loss is: 349.48068  
Current loss is: 349.47784  
Current loss is: 349.47495  
Current loss is: 349.47223  
Current loss is: 349.46964  
Current loss is: 349.4672  
Current loss is: 349.46484  
Current loss is: 349.46255  
Current loss is: 349.4603  
Current loss is: 349.45816  
Current loss is: 349.456  
Current loss is: 349.45392  
Current loss is: 349.4519  
Current loss is: 349.44998  
Current loss is: 349.44818  
Current loss is: 349.44644  
Current loss is: 349.4447  
Current loss is: 349.44308  
Current loss is: 349.44147  
Current loss is: 349.43994  
Current loss is: 349.43845  
Current loss is: 349.43695  
Current loss is: 349.43558  
Current loss is: 349.43423  
Current loss is: 349.43292  
Current loss is: 349.43164  
Current loss is: 349.43042  
Current loss is: 349.42926  
Current loss is: 349.4281  
Current loss is: 349.42703  
Current loss is: 349.426  
Current loss is: 349.42496  
Current loss is: 349.42398  
Current loss is: 349.42303  
Current loss is: 349.42215  
Current loss is: 349.42126  
Current loss is: 349.42044  
Current loss is: 349.41962  
Current loss is: 349.41888  
Current loss is: 349.41815  
Current loss is: 349.4175  
Current loss is: 349.4169  
Current loss is: 349.41647  
Current loss is: 349.41614  
Current loss is: 349.41614  
Current loss is: 349.41666  
Current loss is: 349.41815  
Current loss is: 349.4214  
Current loss is: 349.42792

Current loss is: 349.44077  
Current loss is: 349.46603  
Current loss is: 349.51578  
Current loss is: 349.61478  
Current loss is: 349.8131  
Current loss is: 350.2139  
Current loss is: 351.02594  
Current loss is: 352.66162  
Current loss is: 355.86978  
Current loss is: 361.75708  
Current loss is: 370.9982  
Current loss is: 380.98404  
Current loss is: 382.68234  
Current loss is: 368.80362  
Current loss is: 351.94547  
Current loss is: 351.98486  
Current loss is: 363.29892  
Current loss is: 363.68924  
Current loss is: 352.49786  
Current loss is: 350.66263  
Current loss is: 358.27682  
Current loss is: 356.9089  
Current loss is: 349.9245  
Current loss is: 352.18622  
Current loss is: 355.9205  
Current loss is: 351.63684  
Current loss is: 349.87088  
Current loss is: 353.4971  
Current loss is: 352.3288  
Current loss is: 349.51865  
Current loss is: 351.62372  
Current loss is: 352.1388  
Current loss is: 349.71356  
Current loss is: 350.51263  
Current loss is: 351.61362  
Current loss is: 349.93433  
Current loss is: 349.93066  
Current loss is: 351.05484  
Current loss is: 350.0629  
Current loss is: 349.65646  
Current loss is: 350.5733  
Current loss is: 350.10214  
Current loss is: 349.55023  
Current loss is: 350.19363  
Current loss is: 350.07654  
Current loss is: 349.5322  
Current loss is: 349.91092  
Current loss is: 350.00763  
Current loss is: 349.55658  
Current loss is: 349.71295  
Current loss is: 349.91156  
Current loss is: 349.5949  
Current loss is: 349.58746  
Current loss is: 349.80182  
Current loss is: 349.6275  
Current loss is: 349.5219  
Current loss is: 349.69223  
Current loss is: 349.6412  
Current loss is: 349.50183

Current loss is: 349.59647  
Current loss is: 349.62952  
Current loss is: 349.50967  
Current loss is: 349.52646  
Current loss is: 349.59454  
Current loss is: 349.52606  
Current loss is: 349.4882  
Current loss is: 349.54666  
Current loss is: 349.53384  
Current loss is: 349.47824  
Current loss is: 349.50134  
Current loss is: 349.52408  
Current loss is: 349.48404  
Current loss is: 349.47186  
Current loss is: 349.4996  
Current loss is: 349.48926  
Current loss is: 349.462  
Current loss is: 349.47232  
Current loss is: 349.48328  
Current loss is: 349.46396  
Current loss is: 349.45462  
Current loss is: 349.46695  
Current loss is: 349.4649  
Current loss is: 349.44983  
Current loss is: 349.45032  
Current loss is: 349.45743  
Current loss is: 349.4506  
Current loss is: 349.44193  
Current loss is: 349.44516  
Current loss is: 349.44754  
Current loss is: 349.4407  
Current loss is: 349.43634  
Current loss is: 349.43924  
Current loss is: 349.43912  
Current loss is: 349.43372  
Current loss is: 349.43155  
Current loss is: 349.43344  
Current loss is: 349.4324  
Current loss is: 349.42847  
Current loss is: 349.42715  
Current loss is: 349.4282  
Current loss is: 349.42703  
Current loss is: 349.4242  
Current loss is: 349.4232  
Current loss is: 349.42368  
Current loss is: 349.42267  
Current loss is: 349.42062  
Current loss is: 349.41968  
Current loss is: 349.4198  
Current loss is: 349.4191  
Current loss is: 349.41754  
Current loss is: 349.41666  
Current loss is: 349.41656  
Current loss is: 349.41608  
Current loss is: 349.41495  
Current loss is: 349.41406  
Current loss is: 349.4138  
Current loss is: 349.41348  
Current loss is: 349.41266

Current loss is: 349.41187  
Current loss is: 349.41147  
Current loss is: 349.4112  
Current loss is: 349.41068  
Current loss is: 349.41  
Current loss is: 349.40955  
Current loss is: 349.40927  
Current loss is: 349.4089  
Current loss is: 349.4084  
Current loss is: 349.40796  
Current loss is: 349.40762  
Current loss is: 349.40738  
Current loss is: 349.40698  
Current loss is: 349.4066  
Current loss is: 349.4063  
Current loss is: 349.40604  
Current loss is: 349.4058  
Current loss is: 349.40546  
Current loss is: 349.40515  
Current loss is: 349.4049  
Current loss is: 349.40472  
Current loss is: 349.40448  
Current loss is: 349.4042  
Current loss is: 349.404  
Current loss is: 349.40375  
Current loss is: 349.4036  
Current loss is: 349.40338  
Current loss is: 349.4032  
Current loss is: 349.40295  
Current loss is: 349.4028  
Current loss is: 349.40268  
Current loss is: 349.40247  
Current loss is: 349.4023  
Current loss is: 349.4022  
Current loss is: 349.40204  
Current loss is: 349.40192  
Current loss is: 349.4018  
Current loss is: 349.40164  
Current loss is: 349.40152  
Current loss is: 349.4014  
Current loss is: 349.40128  
Current loss is: 349.40118  
Current loss is: 349.40112  
Current loss is: 349.401  
Current loss is: 349.40088  
Current loss is: 349.4008  
Current loss is: 349.40073  
Current loss is: 349.40063  
Current loss is: 349.4005  
Current loss is: 349.40042  
Current loss is: 349.4004  
Current loss is: 349.4003  
Current loss is: 349.40024  
Current loss is: 349.40015  
Current loss is: 349.40012  
Current loss is: 349.40002  
Current loss is: 349.4  
Current loss is: 349.3999  
Current loss is: 349.3999

Current loss is: 349.39984  
Current loss is: 349.39975  
Current loss is: 349.39972  
Current loss is: 349.39966  
Current loss is: 349.39963  
Current loss is: 349.3996  
Current loss is: 349.39954  
Current loss is: 349.3995  
Current loss is: 349.39948  
Current loss is: 349.39944  
Current loss is: 349.39938  
Current loss is: 349.39938  
Current loss is: 349.39932  
Current loss is: 349.39932  
Current loss is: 349.39926  
Current loss is: 349.39926  
Current loss is: 349.39923  
Current loss is: 349.3992  
Current loss is: 349.3992  
Current loss is: 349.39914  
Current loss is: 349.39914  
Current loss is: 349.3991  
Current loss is: 349.39908  
Current loss is: 349.39908  
Current loss is: 349.39908  
Current loss is: 349.39902  
Current loss is: 349.39902  
Current loss is: 349.399  
Current loss is: 349.399  
Current loss is: 349.399  
Current loss is: 349.39896  
Current loss is: 349.39896  
Current loss is: 349.39893  
Current loss is: 349.39893  
Current loss is: 349.39893  
Current loss is: 349.39886  
Current loss is: 349.39886  
Current loss is: 349.39886  
Current loss is: 349.39883  
Current loss is: 349.39883  
Current loss is: 349.39886  
Current loss is: 349.39883  
Current loss is: 349.3988  
Current loss is: 349.39883  
Current loss is: 349.3988  
Current loss is: 349.3988  
Current loss is: 349.39874  
Current loss is: 349.39874  
Current loss is: 349.3988  
Current loss is: 349.39874  
Current loss is: 349.39874  
Current loss is: 349.39874  
Current loss is: 349.39874  
Current loss is: 349.39874  
Current loss is: 349.39874  
Current loss is: 349.3987  
Current loss is: 349.3987  
Current loss is: 349.3987

Current loss is:	349.3987
Current loss is:	349.3987
Current loss is:	349.3987
Current loss is:	349.3987
Current loss is:	349.39868
Current loss is:	349.39868
Current loss is:	349.3987
Current loss is:	349.3987
Current loss is:	349.3987
Current loss is:	349.39868
Current loss is:	349.39868
Current loss is:	349.39868
Current loss is:	349.39868
Current loss is:	349.39868
Current loss is:	349.39868
Current loss is:	349.39868
Current loss is:	349.39868
Current loss is:	349.39868
Current loss is:	349.39862
Current loss is:	349.39868
Current loss is:	349.39868
Current loss is:	349.39868
Current loss is:	349.39868
Current loss is:	349.39862
Current loss is:	349.39868
Current loss is:	349.39868
Current loss is:	349.39868
Current loss is:	349.39862
Current loss is:	349.39862
Current loss is:	349.39862
Current loss is:	349.39862
Current loss is:	349.39862
Current loss is:	349.39862
Current loss is:	349.39862
Current loss is:	349.39862
Current loss is:	349.39862
Current loss is:	349.39862
Current loss is:	349.39862
Current loss is:	349.39862
Current loss is:	349.39862
Current loss is:	349.39862
Current loss is:	349.39862
Current loss is:	349.39862
Current loss is:	349.39868
Current loss is:	349.39868
Current loss is:	349.3987
Current loss is:	349.3987
Current loss is:	349.3988
Current loss is:	349.39886
Current loss is:	349.39902
Current loss is:	349.39932
Current loss is:	349.39975
Current loss is:	349.4005
Current loss is:	349.40182
Current loss is:	349.40414

Current loss is: 349.40823  
Current loss is: 349.4155  
Current loss is: 349.4286  
Current loss is: 349.45224  
Current loss is: 349.49536  
Current loss is: 349.57446  
Current loss is: 349.72055  
Current loss is: 349.9917  
Current loss is: 350.49518  
Current loss is: 351.42667  
Current loss is: 353.12152  
Current loss is: 356.1004  
Current loss is: 360.94168  
Current loss is: 367.6881  
Current loss is: 374.2279  
Current loss is: 375.38986  
Current loss is: 366.79214  
Current loss is: 354.0717  
Current loss is: 349.54337  
Current loss is: 355.63943  
Current loss is: 360.99866  
Current loss is: 356.80408  
Current loss is: 350.0706  
Current loss is: 351.16574  
Current loss is: 355.7885  
Current loss is: 354.31155  
Current loss is: 349.8667  
Current loss is: 350.73636  
Current loss is: 353.61945  
Current loss is: 351.92758  
Current loss is: 349.48175  
Current loss is: 350.99576  
Current loss is: 352.19302  
Current loss is: 350.29816  
Current loss is: 349.61923  
Current loss is: 351.10403  
Current loss is: 350.90323  
Current loss is: 349.56027  
Current loss is: 350.0268  
Current loss is: 350.76346  
Current loss is: 349.94614  
Current loss is: 349.5298  
Current loss is: 350.2297  
Current loss is: 350.17563  
Current loss is: 349.5278  
Current loss is: 349.7364  
Current loss is: 350.0962  
Current loss is: 349.71063  
Current loss is: 349.5004  
Current loss is: 349.8329  
Current loss is: 349.82208  
Current loss is: 349.5053  
Current loss is: 349.58414  
Current loss is: 349.77167  
Current loss is: 349.604  
Current loss is: 349.47418  
Current loss is: 349.62204  
Current loss is: 349.65128  
Current loss is: 349.49576

Current loss is: 349.49475  
Current loss is: 349.59964  
Current loss is: 349.55118  
Current loss is: 349.4604  
Current loss is: 349.50607  
Current loss is: 349.55334  
Current loss is: 349.49106  
Current loss is: 349.45303  
Current loss is: 349.4994  
Current loss is: 349.51028  
Current loss is: 349.46036  
Current loss is: 349.45023  
Current loss is: 349.48358  
Current loss is: 349.47906  
Current loss is: 349.44498  
Current loss is: 349.44547  
Current loss is: 349.4667  
Current loss is: 349.45847  
Current loss is: 349.4362  
Current loss is: 349.43896  
Current loss is: 349.45203  
Current loss is: 349.44495  
Current loss is: 349.43015  
Current loss is: 349.43204  
Current loss is: 349.4404  
Current loss is: 349.43567  
Current loss is: 349.4255  
Current loss is: 349.42575  
Current loss is: 349.43124  
Current loss is: 349.42883  
Current loss is: 349.42172  
Current loss is: 349.4206  
Current loss is: 349.42404  
Current loss is: 349.42343  
Current loss is: 349.41855  
Current loss is: 349.4165  
Current loss is: 349.4184  
Current loss is: 349.41882  
Current loss is: 349.41592  
Current loss is: 349.4135  
Current loss is: 349.414  
Current loss is: 349.41483  
Current loss is: 349.41348  
Current loss is: 349.41132  
Current loss is: 349.4108  
Current loss is: 349.41138  
Current loss is: 349.4111  
Current loss is: 349.40964  
Current loss is: 349.4086  
Current loss is: 349.40863  
Current loss is: 349.40875  
Current loss is: 349.40808  
Current loss is: 349.40707  
Current loss is: 349.4066  
Current loss is: 349.40662  
Current loss is: 349.40652  
Current loss is: 349.40588  
Current loss is: 349.40524  
Current loss is: 349.405



Current loss is: 349.40494  
Current loss is: 349.40475  
Current loss is: 349.40427  
Current loss is: 349.40384  
Current loss is: 349.40366  
Current loss is: 349.4036  
Current loss is: 349.40338  
Current loss is: 349.40305  
Current loss is: 349.4028  
Current loss is: 349.4026  
Current loss is: 349.4025  
Current loss is: 349.40234  
Current loss is: 349.4021  
Current loss is: 349.4019  
Current loss is: 349.40176  
Current loss is: 349.40164  
Current loss is: 349.40152  
Current loss is: 349.40134  
Current loss is: 349.40118  
Current loss is: 349.40106  
Current loss is: 349.40094  
Current loss is: 349.4009  
Current loss is: 349.40076  
Current loss is: 349.40063  
Current loss is: 349.40054  
Current loss is: 349.40042  
Current loss is: 349.4004  
Current loss is: 349.4003  
Current loss is: 349.40024  
Current loss is: 349.40015  
Current loss is: 349.40002  
Current loss is: 349.4  
Current loss is: 349.3999  
Current loss is: 349.39987  
Current loss is: 349.39984  
Current loss is: 349.39975  
Current loss is: 349.39966  
Current loss is: 349.39963  
Current loss is: 349.3996  
Current loss is: 349.39954  
Current loss is: 349.39948  
Current loss is: 349.39944  
Current loss is: 349.39944  
Current loss is: 349.39935  
Current loss is: 349.39932  
Current loss is: 349.39932  
Current loss is: 349.39926  
Current loss is: 349.39923  
Current loss is: 349.39923  
Current loss is: 349.3992  
Current loss is: 349.39914  
Current loss is: 349.39914  
Current loss is: 349.3991  
Current loss is: 349.39908  
Current loss is: 349.39902  
Current loss is: 349.39902  
Current loss is: 349.39902  
Current loss is: 349.399  
Current loss is: 349.39896

[illegible]

[illegible]

Current loss is: 349.72098  
Current loss is: 349.97952  
Current loss is: 350.4493  
Current loss is: 351.29788  
Current loss is: 352.81262  
Current loss is: 355.42276  
Current loss is: 359.6528  
Current loss is: 365.6116  
Current loss is: 371.9891  
Current loss is: 374.56732  
Current loss is: 368.9144  
Current loss is: 357.0311  
Current loss is: 349.58652  
Current loss is: 352.71423  
Current loss is: 359.21863  
Current loss is: 358.49588  
Current loss is: 351.77484  
Current loss is: 349.72443  
Current loss is: 353.92374  
Current loss is: 355.2043  
Current loss is: 351.18292  
Current loss is: 349.63327  
Current loss is: 352.4399  
Current loss is: 352.86432  
Current loss is: 350.0971  
Current loss is: 349.91275  
Current loss is: 351.83194  
Current loss is: 351.18207  
Current loss is: 349.53683  
Current loss is: 350.29483  
Current loss is: 351.16138  
Current loss is: 350.06827  
Current loss is: 349.55566  
Current loss is: 350.45636  
Current loss is: 350.4086  
Current loss is: 349.56534  
Current loss is: 349.79263  
Current loss is: 350.28723  
Current loss is: 349.82648  
Current loss is: 349.50644  
Current loss is: 349.9172  
Current loss is: 349.95892  
Current loss is: 349.54654  
Current loss is: 349.59738  
Current loss is: 349.86212  
Current loss is: 349.6846  
Current loss is: 349.48328  
Current loss is: 349.65167  
Current loss is: 349.72736  
Current loss is: 349.53467  
Current loss is: 349.49808  
Current loss is: 349.6371  
Current loss is: 349.60468  
Current loss is: 349.4765  
Current loss is: 349.51218  
Current loss is: 349.58868  
Current loss is: 349.52527  
Current loss is: 349.4592  
Current loss is: 349.5079

Current loss is: 349.53918  
Current loss is: 349.4816  
Current loss is: 349.45255  
Current loss is: 349.49216  
Current loss is: 349.50092  
Current loss is: 349.4584  
Current loss is: 349.44623  
Current loss is: 349.47363  
Current loss is: 349.4744  
Current loss is: 349.44516  
Current loss is: 349.43887  
Current loss is: 349.45673  
Current loss is: 349.45627  
Current loss is: 349.43655  
Current loss is: 349.43152  
Current loss is: 349.44278  
Current loss is: 349.44342  
Current loss is: 349.4304  
Current loss is: 349.4251  
Current loss is: 349.43176  
Current loss is: 349.43372  
Current loss is: 349.42563  
Current loss is: 349.4201  
Current loss is: 349.42322  
Current loss is: 349.42587  
Current loss is: 349.4216  
Current loss is: 349.4165  
Current loss is: 349.4169  
Current loss is: 349.4193  
Current loss is: 349.4179  
Current loss is: 349.414  
Current loss is: 349.41254  
Current loss is: 349.41394  
Current loss is: 349.41425  
Current loss is: 349.412  
Current loss is: 349.40988  
Current loss is: 349.4099  
Current loss is: 349.41064  
Current loss is: 349.40994  
Current loss is: 349.40823  
Current loss is: 349.40726  
Current loss is: 349.4075  
Current loss is: 349.40768  
Current loss is: 349.40686  
Current loss is: 349.40576  
Current loss is: 349.4053  
Current loss is: 349.40546  
Current loss is: 349.40536  
Current loss is: 349.40475  
Current loss is: 349.404  
Current loss is: 349.40375  
Current loss is: 349.40378  
Current loss is: 349.40363  
Current loss is: 349.4032  
Current loss is: 349.40274  
Current loss is: 349.4025  
Current loss is: 349.40247  
Current loss is: 349.40234  
Current loss is: 349.40207

Current loss is: 349.40176  
Current loss is: 349.40155  
Current loss is: 349.40152  
Current loss is: 349.40143  
Current loss is: 349.40125  
Current loss is: 349.401  
Current loss is: 349.40082  
Current loss is: 349.40076  
Current loss is: 349.40067  
Current loss is: 349.4006  
Current loss is: 349.40042  
Current loss is: 349.4003  
Current loss is: 349.40018  
Current loss is: 349.40015  
Current loss is: 349.4001  
Current loss is: 349.4  
Current loss is: 349.3999  
Current loss is: 349.39978  
Current loss is: 349.39975  
Current loss is: 349.39972  
Current loss is: 349.39966  
Current loss is: 349.3996  
Current loss is: 349.3995  
Current loss is: 349.39948  
Current loss is: 349.39944  
Current loss is: 349.39938  
Current loss is: 349.39935  
Current loss is: 349.39926  
Current loss is: 349.39926  
Current loss is: 349.39923  
Current loss is: 349.3992  
Current loss is: 349.39914  
Current loss is: 349.3991  
Current loss is: 349.39908  
Current loss is: 349.39908  
Current loss is: 349.39908  
Current loss is: 349.39902  
Current loss is: 349.399  
Current loss is: 349.39896  
Current loss is: 349.39896  
Current loss is: 349.39893  
Current loss is: 349.39893  
Current loss is: 349.39893  
Current loss is: 349.39886  
Current loss is: 349.39886  
Current loss is: 349.39886  
Current loss is: 349.39886  
Current loss is: 349.39883  
Current loss is: 349.39883  
Current loss is: 349.3988  
Current loss is: 349.3988  
Current loss is: 349.3988  
Current loss is: 349.3988  
Current loss is: 349.39874  
Current loss is: 349.39874  
Current loss is: 349.39874  
Current loss is: 349.39874  
Current loss is: 349.3987  
Current loss is: 349.3987

[illegible]

[illegible]



Current loss is: 349.4349  
Current loss is: 349.46432  
Current loss is: 349.5184  
Current loss is: 349.6181  
Current loss is: 349.8033  
Current loss is: 350.14746  
Current loss is: 350.78748  
Current loss is: 351.96454  
Current loss is: 354.09338  
Current loss is: 357.75204  
Current loss is: 363.5291  
Current loss is: 370.94632  
Current loss is: 377.0259  
Current loss is: 375.3862  
Current loss is: 363.86572  
Current loss is: 351.5502  
Current loss is: 350.74744  
Current loss is: 358.61554  
Current loss is: 360.85266  
Current loss is: 353.71396  
Current loss is: 349.48114  
Current loss is: 353.8703  
Current loss is: 356.21234  
Current loss is: 351.59525  
Current loss is: 349.71686  
Current loss is: 353.13342  
Current loss is: 353.08746  
Current loss is: 349.83047  
Current loss is: 350.54462  
Current loss is: 352.44318  
Current loss is: 350.68823  
Current loss is: 349.60687  
Current loss is: 351.22568  
Current loss is: 351.02936  
Current loss is: 349.5776  
Current loss is: 350.2751  
Current loss is: 350.87866  
Current loss is: 349.80902  
Current loss is: 349.74664  
Current loss is: 350.50153  
Current loss is: 350.00162  
Current loss is: 349.54907  
Current loss is: 350.09744  
Current loss is: 350.06378  
Current loss is: 349.54883  
Current loss is: 349.7756  
Current loss is: 349.99866  
Current loss is: 349.62924  
Current loss is: 349.58035  
Current loss is: 349.85068  
Current loss is: 349.703  
Current loss is: 349.50952  
Current loss is: 349.68115  
Current loss is: 349.71826  
Current loss is: 349.52524  
Current loss is: 349.54874  
Current loss is: 349.66522  
Current loss is: 349.56854  
Current loss is: 349.4873

Current loss is: 349.57422  
Current loss is: 349.5851  
Current loss is: 349.48987  
Current loss is: 349.4955  
Current loss is: 349.55368  
Current loss is: 349.5142  
Current loss is: 349.46384  
Current loss is: 349.49664  
Current loss is: 349.51575  
Current loss is: 349.47205  
Current loss is: 349.4559  
Current loss is: 349.48474  
Current loss is: 349.48218  
Current loss is: 349.45023  
Current loss is: 349.4497  
Current loss is: 349.46808  
Current loss is: 349.4586  
Current loss is: 349.4382  
Current loss is: 349.442  
Current loss is: 349.4524  
Current loss is: 349.443  
Current loss is: 349.43015  
Current loss is: 349.43372  
Current loss is: 349.4397  
Current loss is: 349.43256  
Current loss is: 349.42395  
Current loss is: 349.42612  
Current loss is: 349.42987  
Current loss is: 349.4252  
Current loss is: 349.41904  
Current loss is: 349.4197  
Current loss is: 349.4223  
Current loss is: 349.41968  
Current loss is: 349.4151  
Current loss is: 349.41464  
Current loss is: 349.41644  
Current loss is: 349.4153  
Current loss is: 349.41202  
Current loss is: 349.41083  
Current loss is: 349.41183  
Current loss is: 349.41168  
Current loss is: 349.40964  
Current loss is: 349.4081  
Current loss is: 349.40833  
Current loss is: 349.4086  
Current loss is: 349.4076  
Current loss is: 349.4062  
Current loss is: 349.4058  
Current loss is: 349.40604  
Current loss is: 349.4058  
Current loss is: 349.4048  
Current loss is: 349.4041  
Current loss is: 349.40402  
Current loss is: 349.40408  
Current loss is: 349.40366  
Current loss is: 349.40298  
Current loss is: 349.40262  
Current loss is: 349.40262  
Current loss is: 349.40256

Current loss is: 349.40216  
Current loss is: 349.40176  
Current loss is: 349.40158  
Current loss is: 349.40155  
Current loss is: 349.40143  
Current loss is: 349.40112  
Current loss is: 349.40088  
Current loss is: 349.4008  
Current loss is: 349.40073  
Current loss is: 349.40063  
Current loss is: 349.40042  
Current loss is: 349.40027  
Current loss is: 349.40015  
Current loss is: 349.40012  
Current loss is: 349.4001  
Current loss is: 349.3999  
Current loss is: 349.39984  
Current loss is: 349.39972  
Current loss is: 349.39966  
Current loss is: 349.39963  
Current loss is: 349.39954  
Current loss is: 349.39948  
Current loss is: 349.39938  
Current loss is: 349.39938  
Current loss is: 349.39932  
Current loss is: 349.39926  
Current loss is: 349.39923  
Current loss is: 349.3992  
Current loss is: 349.39914  
Current loss is: 349.3991  
Current loss is: 349.3991  
Current loss is: 349.39908  
Current loss is: 349.39902  
Current loss is: 349.399  
Current loss is: 349.39896  
Current loss is: 349.39896  
Current loss is: 349.39893  
Current loss is: 349.39893  
Current loss is: 349.39886  
Current loss is: 349.39886  
Current loss is: 349.39883  
Current loss is: 349.39883  
Current loss is: 349.39883  
Current loss is: 349.3988  
Current loss is: 349.3988  
Current loss is: 349.3988  
Current loss is: 349.3988  
Current loss is: 349.39874  
Current loss is: 349.39874  
Current loss is: 349.39874  
Current loss is: 349.39874  
Current loss is: 349.3987  
Current loss is: 349.3987  
Current loss is: 349.3987  
Current loss is: 349.3987  
Current loss is: 349.3987  
Current loss is: 349.39868  
Current loss is: 349.3987

[illegible]

[illegible]

Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.3986
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39868
Current	loss	is:	349.39868
Current	loss	is:	349.3987
Current	loss	is:	349.39883
Current	loss	is:	349.39896
Current	loss	is:	349.39914
Current	loss	is:	349.3995
Current	loss	is:	349.40018
Current	loss	is:	349.4014
Current	loss	is:	349.4035
Current	loss	is:	349.40735
Current	loss	is:	349.41428
Current	loss	is:	349.42688
Current	loss	is:	349.44998
Current	loss	is:	349.49258
Current	loss	is:	349.5715
Current	loss	is:	349.7186
Current	loss	is:	349.99295
Current	loss	is:	350.50595
Current	loss	is:	351.4564
Current	loss	is:	353.1987
Current	loss	is:	356.26062
Current	loss	is:	361.31287
Current	loss	is:	368.37598
Current	loss	is:	375.60135
Current	loss	is:	377.15015
Current	loss	is:	368.45395
Current	loss	is:	354.581
Current	loss	is:	349.57416
Current	loss	is:	356.2827
Current	loss	is:	361.33496

Current loss is: 355.8359  
Current loss is: 349.5834  
Current loss is: 352.6378  
Current loss is: 356.43448  
Current loss is: 352.54532  
Current loss is: 349.5308  
Current loss is: 352.72025  
Current loss is: 353.42654  
Current loss is: 350.05304  
Current loss is: 350.39078  
Current loss is: 352.48486  
Current loss is: 350.79544  
Current loss is: 349.6299  
Current loss is: 351.30258  
Current loss is: 351.0179  
Current loss is: 349.57852  
Current loss is: 350.43506  
Current loss is: 350.8735  
Current loss is: 349.72488  
Current loss is: 349.91522  
Current loss is: 350.5742  
Current loss is: 349.8685  
Current loss is: 349.65182  
Current loss is: 350.24582  
Current loss is: 349.94803  
Current loss is: 349.5556  
Current loss is: 349.95163  
Current loss is: 349.95215  
Current loss is: 349.5581  
Current loss is: 349.72363  
Current loss is: 349.8884  
Current loss is: 349.60486  
Current loss is: 349.57748  
Current loss is: 349.77682  
Current loss is: 349.65042  
Current loss is: 349.51358  
Current loss is: 349.6491  
Current loss is: 349.6607  
Current loss is: 349.5134  
Current loss is: 349.54272  
Current loss is: 349.6232  
Current loss is: 349.54007  
Current loss is: 349.48566  
Current loss is: 349.5536  
Current loss is: 349.55264  
Current loss is: 349.4794  
Current loss is: 349.48828  
Current loss is: 349.5294  
Current loss is: 349.4949  
Current loss is: 349.45792  
Current loss is: 349.48358  
Current loss is: 349.4955  
Current loss is: 349.46094  
Current loss is: 349.44882  
Current loss is: 349.47012  
Current loss is: 349.46744  
Current loss is: 349.4425  
Current loss is: 349.44104  
Current loss is: 349.4546

Current loss is: 349.44788  
Current loss is: 349.43152  
Current loss is: 349.43283  
Current loss is: 349.44095  
Current loss is: 349.43472  
Current loss is: 349.42395  
Current loss is: 349.42508  
Current loss is: 349.43008  
Current loss is: 349.42575  
Current loss is: 349.4183  
Current loss is: 349.41846  
Current loss is: 349.42175  
Current loss is: 349.4193  
Current loss is: 349.41403  
Current loss is: 349.41318  
Current loss is: 349.41534  
Current loss is: 349.4144  
Current loss is: 349.4108  
Current loss is: 349.4093  
Current loss is: 349.41046  
Current loss is: 349.41055  
Current loss is: 349.40833  
Current loss is: 349.4066  
Current loss is: 349.40692  
Current loss is: 349.40735  
Current loss is: 349.4063  
Current loss is: 349.4048  
Current loss is: 349.4044  
Current loss is: 349.4048  
Current loss is: 349.40454  
Current loss is: 349.4035  
Current loss is: 349.4028  
Current loss is: 349.40283  
Current loss is: 349.40295  
Current loss is: 349.4025  
Current loss is: 349.40182  
Current loss is: 349.40155  
Current loss is: 349.40164  
Current loss is: 349.40155  
Current loss is: 349.40118  
Current loss is: 349.40076  
Current loss is: 349.40063  
Current loss is: 349.40067  
Current loss is: 349.4006  
Current loss is: 349.4003  
Current loss is: 349.4001  
Current loss is: 349.4  
Current loss is: 349.40002  
Current loss is: 349.39996  
Current loss is: 349.39975  
Current loss is: 349.3996  
Current loss is: 349.39954  
Current loss is: 349.39954  
Current loss is: 349.3995  
Current loss is: 349.39935  
Current loss is: 349.39932  
Current loss is: 349.39923  
Current loss is: 349.39923  
Current loss is: 349.3992



[illegible]

[illegible]

[illegible]

Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39868
Current	loss	is:	349.39868
Current	loss	is:	349.3987
Current	loss	is:	349.39874
Current	loss	is:	349.3988
Current	loss	is:	349.39896
Current	loss	is:	349.3992
Current	loss	is:	349.39963
Current	loss	is:	349.4003
Current	loss	is:	349.40158
Current	loss	is:	349.40384
Current	loss	is:	349.40784
Current	loss	is:	349.41504
Current	loss	is:	349.42798
Current	loss	is:	349.4515
Current	loss	is:	349.49448
Current	loss	is:	349.57324
Current	loss	is:	349.71826
Current	loss	is:	349.98648
Current	loss	is:	350.48047
Current	loss	is:	351.38947
Current	loss	is:	353.02438
Current	loss	is:	355.88818
Current	loss	is:	360.49268
Current	loss	is:	366.9991
Current	loss	is:	373.39468
Current	loss	is:	375.16376
Current	loss	is:	367.30655
Current	loss	is:	354.70367
Current	loss	is:	349.4696
Current	loss	is:	355.1307
Current	loss	is:	360.28827
Current	loss	is:	355.79214
Current	loss	is:	349.72546
Current	loss	is:	351.90463
Current	loss	is:	355.70963
Current	loss	is:	352.71808

Current loss is: 349.50375  
Current loss is: 352.0806  
Current loss is: 353.27512  
Current loss is: 350.2655  
Current loss is: 350.08026  
Current loss is: 352.16245  
Current loss is: 350.95715  
Current loss is: 349.56964  
Current loss is: 350.97098  
Current loss is: 351.06308  
Current loss is: 349.65247  
Current loss is: 350.17343  
Current loss is: 350.8204  
Current loss is: 349.85056  
Current loss is: 349.74884  
Current loss is: 350.45728  
Current loss is: 349.99265  
Current loss is: 349.57993  
Current loss is: 350.09894  
Current loss is: 350.03543  
Current loss is: 349.56335  
Current loss is: 349.80762  
Current loss is: 349.98154  
Current loss is: 349.61908  
Current loss is: 349.61383  
Current loss is: 349.85574  
Current loss is: 349.68228  
Current loss is: 349.5251  
Current loss is: 349.69955  
Current loss is: 349.70392  
Current loss is: 349.5222  
Current loss is: 349.56442  
Current loss is: 349.66266  
Current loss is: 349.55847  
Current loss is: 349.4917  
Current loss is: 349.57642  
Current loss is: 349.57742  
Current loss is: 349.48627  
Current loss is: 349.49445  
Current loss is: 349.5478  
Current loss is: 349.509  
Current loss is: 349.45972  
Current loss is: 349.48853  
Current loss is: 349.50867  
Current loss is: 349.4686  
Current loss is: 349.44788  
Current loss is: 349.4732  
Current loss is: 349.47656  
Current loss is: 349.44632  
Current loss is: 349.43835  
Current loss is: 349.45584  
Current loss is: 349.45392  
Current loss is: 349.43314  
Current loss is: 349.4292  
Current loss is: 349.44052  
Current loss is: 349.4386  
Current loss is: 349.4246  
Current loss is: 349.4211  
Current loss is: 349.42828

Current loss is: 349.42786  
Current loss is: 349.41867  
Current loss is: 349.41476  
Current loss is: 349.41888  
Current loss is: 349.41998  
Current loss is: 349.41434  
Current loss is: 349.41022  
Current loss is: 349.41196  
Current loss is: 349.41376  
Current loss is: 349.4111  
Current loss is: 349.40738  
Current loss is: 349.40717  
Current loss is: 349.40878  
Current loss is: 349.40823  
Current loss is: 349.40564  
Current loss is: 349.40424  
Current loss is: 349.405  
Current loss is: 349.40552  
Current loss is: 349.4043  
Current loss is: 349.40274  
Current loss is: 349.40247  
Current loss is: 349.40308  
Current loss is: 349.40298  
Current loss is: 349.40198  
Current loss is: 349.40118  
Current loss is: 349.40125  
Current loss is: 349.40155  
Current loss is: 349.4013  
Current loss is: 349.40067  
Current loss is: 349.40027  
Current loss is: 349.4003  
Current loss is: 349.40048  
Current loss is: 349.4003  
Current loss is: 349.39987  
Current loss is: 349.39966  
Current loss is: 349.39972  
Current loss is: 349.39978  
Current loss is: 349.39963  
Current loss is: 349.39944  
Current loss is: 349.39926  
Current loss is: 349.39926  
Current loss is: 349.39932  
Current loss is: 349.39926  
Current loss is: 349.3991  
Current loss is: 349.39902  
Current loss is: 349.39902  
Current loss is: 349.39902  
Current loss is: 349.399  
Current loss is: 349.39893  
Current loss is: 349.39886  
Current loss is: 349.39883  
Current loss is: 349.39883  
Current loss is: 349.39886  
Current loss is: 349.39883  
Current loss is: 349.3988  
Current loss is: 349.39874  
Current loss is: 349.39874  
Current loss is: 349.39874  
Current loss is: 349.39874

[illegible]

[illegible]



[illegible]

[illegible]

Current loss is: 349.3986  
Current loss is: 349.39862  
Current loss is: 349.3986  
Current loss is: 349.39862  
Current loss is: 349.39862  
Current loss is: 349.39862  
Current loss is: 349.39862  
Current loss is: 349.39862  
Current loss is: 349.39862  
Current loss is: 349.39862  
Current loss is: 349.39868  
Current loss is: 349.3987  
Current loss is: 349.39886  
Current loss is: 349.3992  
Current loss is: 349.3999  
Current loss is: 349.40155  
Current loss is: 349.40546  
Current loss is: 349.41458  
Current loss is: 349.4362  
Current loss is: 349.4873  
Current loss is: 349.60895  
Current loss is: 349.8987  
Current loss is: 350.59082  
Current loss is: 352.2293  
Current loss is: 356.05963  
Current loss is: 364.49103  
Current loss is: 381.06876  
Current loss is: 403.81458  
Current loss is: 413.6485  
Current loss is: 383.01648  
Current loss is: 350.2709  
Current loss is: 365.17365  
Current loss is: 378.46432  
Current loss is: 354.7663  
Current loss is: 355.9147  
Current loss is: 367.99127  
Current loss is: 351.66666  
Current loss is: 357.02307  
Current loss is: 359.93018  
Current loss is: 349.90207  
Current loss is: 358.67343  
Current loss is: 352.34744  
Current loss is: 353.09763  
Current loss is: 355.40042  
Current loss is: 350.22467  
Current loss is: 355.2395  
Current loss is: 350.5847  
Current loss is: 353.10303  
Current loss is: 351.97864  
Current loss is: 351.1132  
Current loss is: 352.77115  
Current loss is: 350.22803  
Current loss is: 352.5569  
Current loss is: 350.3315  
Current loss is: 351.69147  
Current loss is: 350.85675  
Current loss is: 350.77335  
Current loss is: 351.2615  
Current loss is: 350.2172

Current loss is: 351.26324  
Current loss is: 350.1258  
Current loss is: 350.8905  
Current loss is: 350.33243  
Current loss is: 350.39563  
Current loss is: 350.5474  
Current loss is: 350.05115  
Current loss is: 350.5483  
Current loss is: 349.9811  
Current loss is: 350.3147  
Current loss is: 350.09543  
Current loss is: 350.01755  
Current loss is: 350.1832  
Current loss is: 349.85498  
Current loss is: 350.10315  
Current loss is: 349.87402  
Current loss is: 349.9058  
Current loss is: 349.94183  
Current loss is: 349.75995  
Current loss is: 349.90604  
Current loss is: 349.75134  
Current loss is: 349.77115  
Current loss is: 349.79114  
Current loss is: 349.6705  
Current loss is: 349.75375  
Current loss is: 349.67038  
Current loss is: 349.65363  
Current loss is: 349.68646  
Current loss is: 349.60028  
Current loss is: 349.6358  
Current loss is: 349.6114  
Current loss is: 349.56775  
Current loss is: 349.60092  
Current loss is: 349.55475  
Current loss is: 349.54736  
Current loss is: 349.55942  
Current loss is: 349.51804  
Current loss is: 349.52698  
Current loss is: 349.52203  
Current loss is: 349.49387  
Current loss is: 349.50552  
Current loss is: 349.49252  
Current loss is: 349.47598  
Current loss is: 349.48492  
Current loss is: 349.47043  
Current loss is: 349.4614  
Current loss is: 349.46692  
Current loss is: 349.45395  
Current loss is: 349.44904  
Current loss is: 349.45206  
Current loss is: 349.4415  
Current loss is: 349.4385  
Current loss is: 349.44012  
Current loss is: 349.43195  
Current loss is: 349.42978  
Current loss is: 349.43073  
Current loss is: 349.4245  
Current loss is: 349.42267  
Current loss is: 349.42328

Current loss is: 349.4187  
Current loss is: 349.41696  
Current loss is: 349.41748  
Current loss is: 349.41418  
Current loss is: 349.4125  
Current loss is: 349.41296  
Current loss is: 349.41068  
Current loss is: 349.40906  
Current loss is: 349.40936  
Current loss is: 349.40796  
Current loss is: 349.40643  
Current loss is: 349.40662  
Current loss is: 349.4058  
Current loss is: 349.40448  
Current loss is: 349.40448  
Current loss is: 349.4041  
Current loss is: 349.40305  
Current loss is: 349.40286  
Current loss is: 349.40274  
Current loss is: 349.40198  
Current loss is: 349.40167  
Current loss is: 349.40167  
Current loss is: 349.40118  
Current loss is: 349.40082  
Current loss is: 349.40088  
Current loss is: 349.4006  
Current loss is: 349.40024  
Current loss is: 349.40018  
Current loss is: 349.40012  
Current loss is: 349.39984  
Current loss is: 349.39972  
Current loss is: 349.39972  
Current loss is: 349.3995  
Current loss is: 349.39938  
Current loss is: 349.39935  
Current loss is: 349.39932  
Current loss is: 349.39914  
Current loss is: 349.39914  
Current loss is: 349.3991  
Current loss is: 349.39902  
Current loss is: 349.399  
Current loss is: 349.399  
Current loss is: 349.39893  
Current loss is: 349.39886  
Current loss is: 349.39886  
Current loss is: 349.39883  
Current loss is: 349.3988  
Current loss is: 349.3988  
Current loss is: 349.39874  
Current loss is: 349.39874  
Current loss is: 349.3987  
Current loss is: 349.3987  
Current loss is: 349.3987  
Current loss is: 349.39868  
Current loss is: 349.3987  
Current loss is: 349.39868  
Current loss is: 349.39868  
Current loss is: 349.39868  
Current loss is: 349.39868  
Current loss is: 349.39868

[illegible]

[illegible]





[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39862
Current	loss	is:	349.39868
Current	loss	is:	349.3987
Current	loss	is:	349.39886
Current	loss	is:	349.3992
Current	loss	is:	349.4
Current	loss	is:	349.40182
Current	loss	is:	349.40616
Current	loss	is:	349.41638
Current	loss	is:	349.4408
Current	loss	is:	349.49915
Current	loss	is:	349.63882
Current	loss	is:	349.97504
Current	loss	is:	350.78027
Current	loss	is:	352.70438
Current	loss	is:	357.14902
Current	loss	is:	366.88638
Current	loss	is:	384.48267
Current	loss	is:	405.63974
Current	loss	is:	403.43195
Current	loss	is:	368.0877
Current	loss	is:	349.57202
Current	loss	is:	383.30322
Current	loss	is:	432.40448
Current	loss	is:	371.0419
Current	loss	is:	366.23456
Current	loss	is:	393.4888
Current	loss	is:	349.96042
Current	loss	is:	383.87222
Current	loss	is:	354.72586
Current	loss	is:	370.75522

Current loss is: 357.52826  
Current loss is: 363.6803  
Current loss is: 357.44568  
Current loss is: 360.78275  
Current loss is: 355.62177  
Current loss is: 359.6527  
Current loss is: 353.77832  
Current loss is: 359.201  
Current loss is: 352.23544  
Current loss is: 358.62842  
Current loss is: 351.55798  
Current loss is: 357.55252  
Current loss is: 351.65958  
Current loss is: 356.05695  
Current loss is: 352.28787  
Current loss is: 354.38516  
Current loss is: 353.0595  
Current loss is: 352.93002  
Current loss is: 353.54932  
Current loss is: 351.96512  
Current loss is: 353.61487  
Current loss is: 351.4919  
Current loss is: 353.29727  
Current loss is: 351.39087  
Current loss is: 352.75662  
Current loss is: 351.4619  
Current loss is: 352.1781  
Current loss is: 351.53906  
Current loss is: 351.6756  
Current loss is: 351.5527  
Current loss is: 351.28604  
Current loss is: 351.478  
Current loss is: 351.0075  
Current loss is: 351.3412  
Current loss is: 350.80426  
Current loss is: 351.1688  
Current loss is: 350.6509  
Current loss is: 350.98663  
Current loss is: 350.52335  
Current loss is: 350.80933  
Current loss is: 350.41104  
Current loss is: 350.64484  
Current loss is: 350.30786  
Current loss is: 350.4945  
Current loss is: 350.21286  
Current loss is: 350.35815  
Current loss is: 350.12628  
Current loss is: 350.23334  
Current loss is: 350.0493  
Current loss is: 350.1188  
Current loss is: 349.98178  
Current loss is: 350.01303  
Current loss is: 349.92355  
Current loss is: 349.91675  
Current loss is: 349.87195  
Current loss is: 349.83115  
Current loss is: 349.82407  
Current loss is: 349.759  
Current loss is: 349.77603

Current loss is: 349.70197  
Current loss is: 349.72568  
Current loss is: 349.6602  
Current loss is: 349.6732  
Current loss is: 349.63043  
Current loss is: 349.62256  
Current loss is: 349.6065  
Current loss is: 349.5792  
Current loss is: 349.58212  
Current loss is: 349.5474  
Current loss is: 349.55396  
Current loss is: 349.52692  
Current loss is: 349.524  
Current loss is: 349.51273  
Current loss is: 349.49768  
Current loss is: 349.49832  
Current loss is: 349.47943  
Current loss is: 349.4809  
Current loss is: 349.4686  
Current loss is: 349.46304  
Current loss is: 349.46027  
Current loss is: 349.4493  
Current loss is: 349.4502  
Current loss is: 349.4413  
Current loss is: 349.43884  
Current loss is: 349.43604  
Current loss is: 349.42963  
Current loss is: 349.4299  
Current loss is: 349.42432  
Current loss is: 349.42276  
Current loss is: 349.42102  
Current loss is: 349.41696  
Current loss is: 349.4171  
Current loss is: 349.4138  
Current loss is: 349.41254  
Current loss is: 349.41174  
Current loss is: 349.40915  
Current loss is: 349.40918  
Current loss is: 349.40747  
Current loss is: 349.40634  
Current loss is: 349.40616  
Current loss is: 349.40454  
Current loss is: 349.4044  
Current loss is: 349.40366  
Current loss is: 349.40274  
Current loss is: 349.4028  
Current loss is: 349.40192  
Current loss is: 349.40164  
Current loss is: 349.40143  
Current loss is: 349.40076  
Current loss is: 349.4008  
Current loss is: 349.40042  
Current loss is: 349.4001  
Current loss is: 349.40012  
Current loss is: 349.39975  
Current loss is: 349.39966  
Current loss is: 349.3996  
Current loss is: 349.39935  
Current loss is: 349.39935



[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]



[illegible]

```

Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
Current loss is: 349.39862
44.009725 seconds (141.85 M allocations: 122.964 GiB, 19.53% gc time)
(Float32[107.416 99.942 ... 81.693 104.711], Float32[12.197989 15.554535 ... 23
.75008 13.412803])

```

### 0.3 Analyzing the solution

Now let us find a Monte-Carlo Solution and plot the both:

```

monte_carlo_sol = []
x_out = collect(85:5.00:110.00)
for x in x_out
    u_0= [x]
    g_val(du , u , p , t) = du . = 0.4.*u
    f_val(du , u , p , t) = du . = 0.02.*u
    dt = 0.01
    tspan = (0.0,1.0)
    prob = SDEProblem(f_val,g_val,u_0,tspan)
    output_func(sol,i) = (sol[end],false)
    ensembleprob_val = EnsembleProblem(prob , output_func = output_func )
    sim_val = solve(ensembleprob_val, EM(), EnsembleThreads() , dt=0.01,
trajectories=100000,adaptive=false)
    s = reduce(hcat , sim_val.u)
    mean_phi = sum(phi(s))/length(phi(s))
    global monte_carlo_sol = push!(monte_carlo_sol , mean_phi)
end

```

##Plotting the Solutions We should reshape the inputs and outputs to make it compatible with our model. This is the most important part. The algorithm gives a distributed function over all initial prices in the xspan.

```

x_model = reshape(x_out, 1 , size(x_out)[1])
if use_gpu == true
    m = fmap(cpu , m)
end
y_out = m(x_model)
y_out = reshape(y_out , 6 , 1)

6×1 Array{Float32,2}:
22.264921

```

20.01944  
17.77397  
15.528501  
13.283008  
11.037535

And now finally we can plot the solutions

```
plot(x_out , y_out , lw = 3 , xaxis="Initial Stock Price", yaxis="Payoff" , label =  
"NNKolmogorov")  
plot!(x_out , monte_carlo_sol , lw = 3 , xaxis="Initial Stock Price", yaxis="Payoff"  
,label = "Monte Carlo Solutions")
```

