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Finger Exercises 1 due Aug 3, 2023 05:00 IST Completed

Problem: Extract the initial condition, state evolution, and timestep

3/3 points (graded)

MO2.4 MO2.7

Consider an Initial Value Problem (IVP) solver that is described in the documentation below:

```
def solve(N):
    Solves an IVP using a timestep dt and method.
    Input:
      N: number of timesteps (including initial state)
    Returns:
        t (float list): time values at which u(t) is approximated. The nth item in
            the list is the time of the nth step, tn = t[n].
        u (list of float lists): The values of the states at each step. The nth
            item in the list is the values of the states at tn. i.e. u(tn) = u[n]
            where u[n] is a float list. So, if there are three equations being integrated,
then
            u[n][0], u[n][1], and u[n][2] are the values of the three states at time t=t[n]
  # ###############################
  # ... some algorithm here ...
  # ############################
  return t, u
```

Supposed we call t, u = solve(3) and the result gives:

```
t= [0.0, 0.8, 1.6]
u= [[2.7, 3.1, 4.2], [1.2, 1.8, 4.5], [0.4, 2.8, 9.2]]
```

If $\underline{u}=[p,q,r]$, what were the initial conditions $p\left(0\right)$, $q\left(0\right)$, and $r\left(0\right)$ for this IVP?

$$\bigcirc \ p\left(0
ight)=0.0$$
 , $q\left(0
ight)=0.0$, and $r\left(0
ight)=0.0$

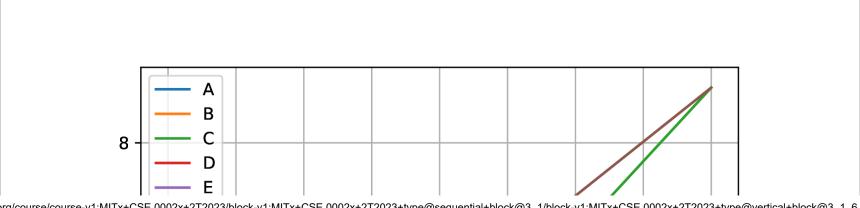
$$leftondown p\left(0
ight)=2.7$$
 , $q\left(0
ight)=3.1$, and $r\left(0
ight)=4.2$

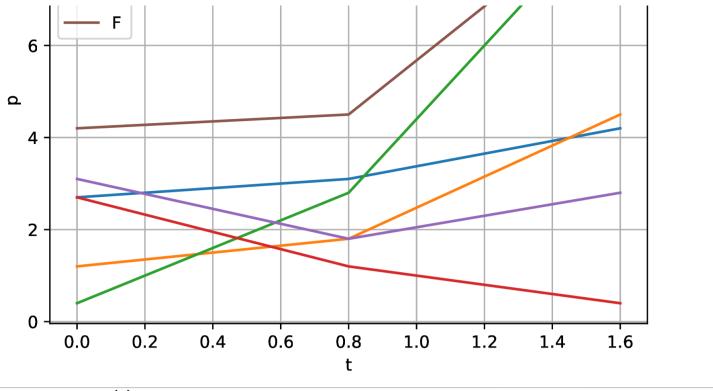
$$\bigcirc \ p\left(0
ight)=2.7$$
 , $q\left(0
ight)=1.2$, and $r\left(0
ight)=0.4$

Not enough information to answer



Consider the figure below:





Which line is a plot of p(t) using the results given above from calling solve(3)?

○ A
ОВ
○ c
O D
○ E
○ F
Not enough information to answer
What was the timestep Δt used by the solver? Enter -1 if there is not enough information to determine Δt .
0.8 ✓ Answer: 0.8
Submit
Answers are displayed within the problem



SOLUTION: The solution will be available shortly after the due date in Section 3.2.6.

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