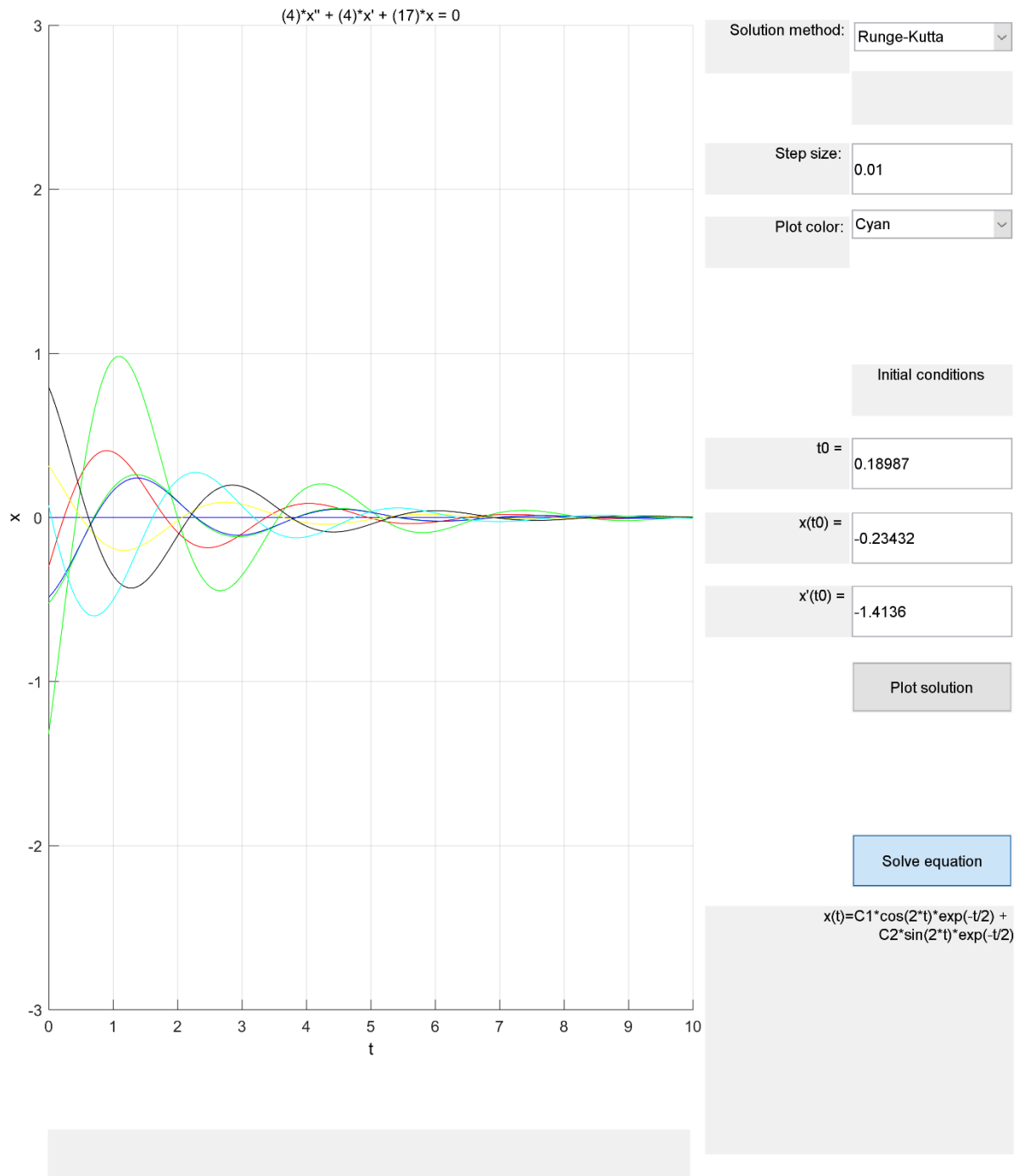


Exercise 1

a)



Each of the 6 solutions decays while oscillating.

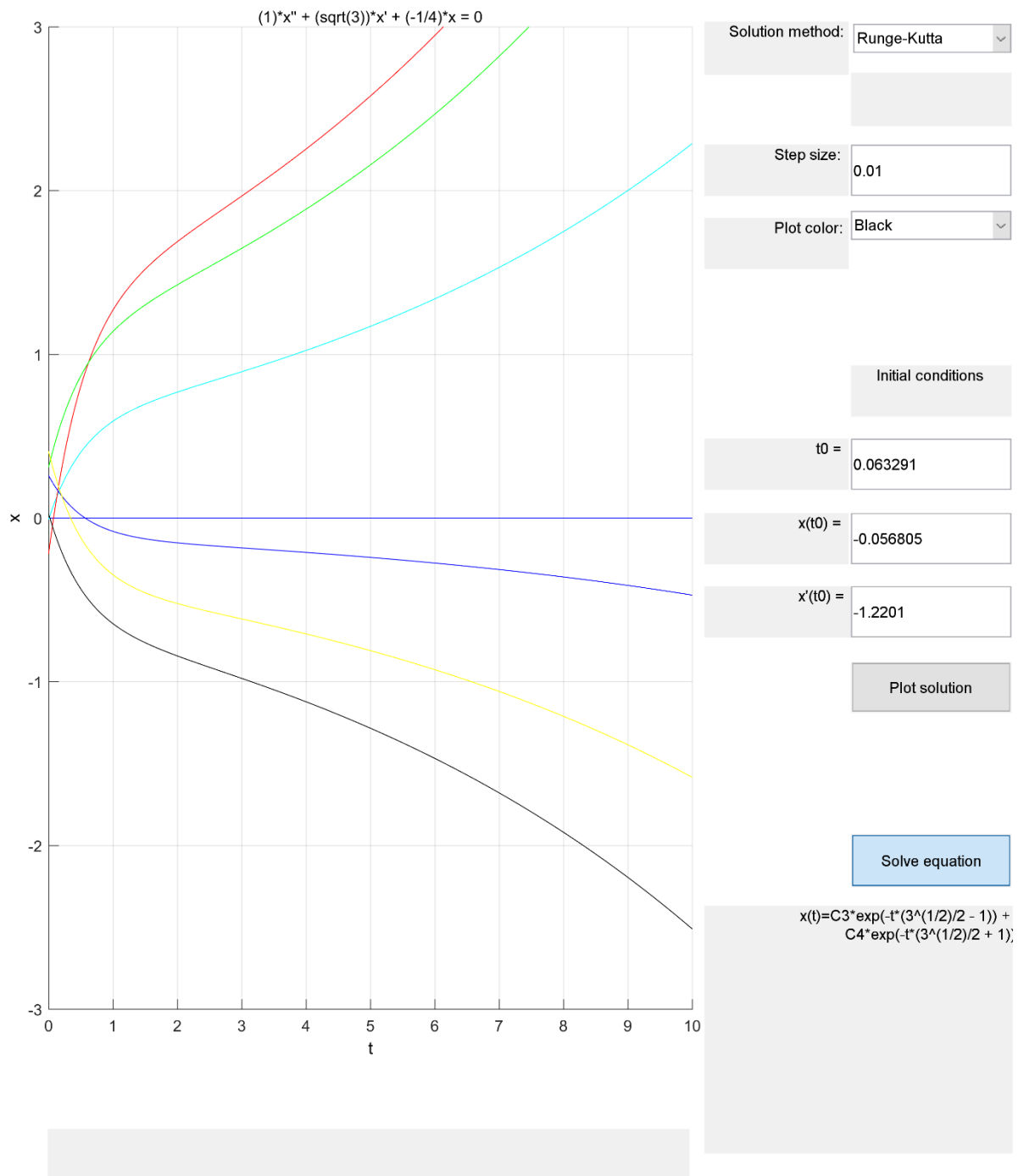
b) 100% of solutions decay while oscillating.

c)

Solution is $x(t) = c_1 e^{-t/2} \cos(2t) + c_2 e^{-t/2} \sin(2t)$. This makes sense because this system will always decay if it is oscillating.

Exercise 2

a)

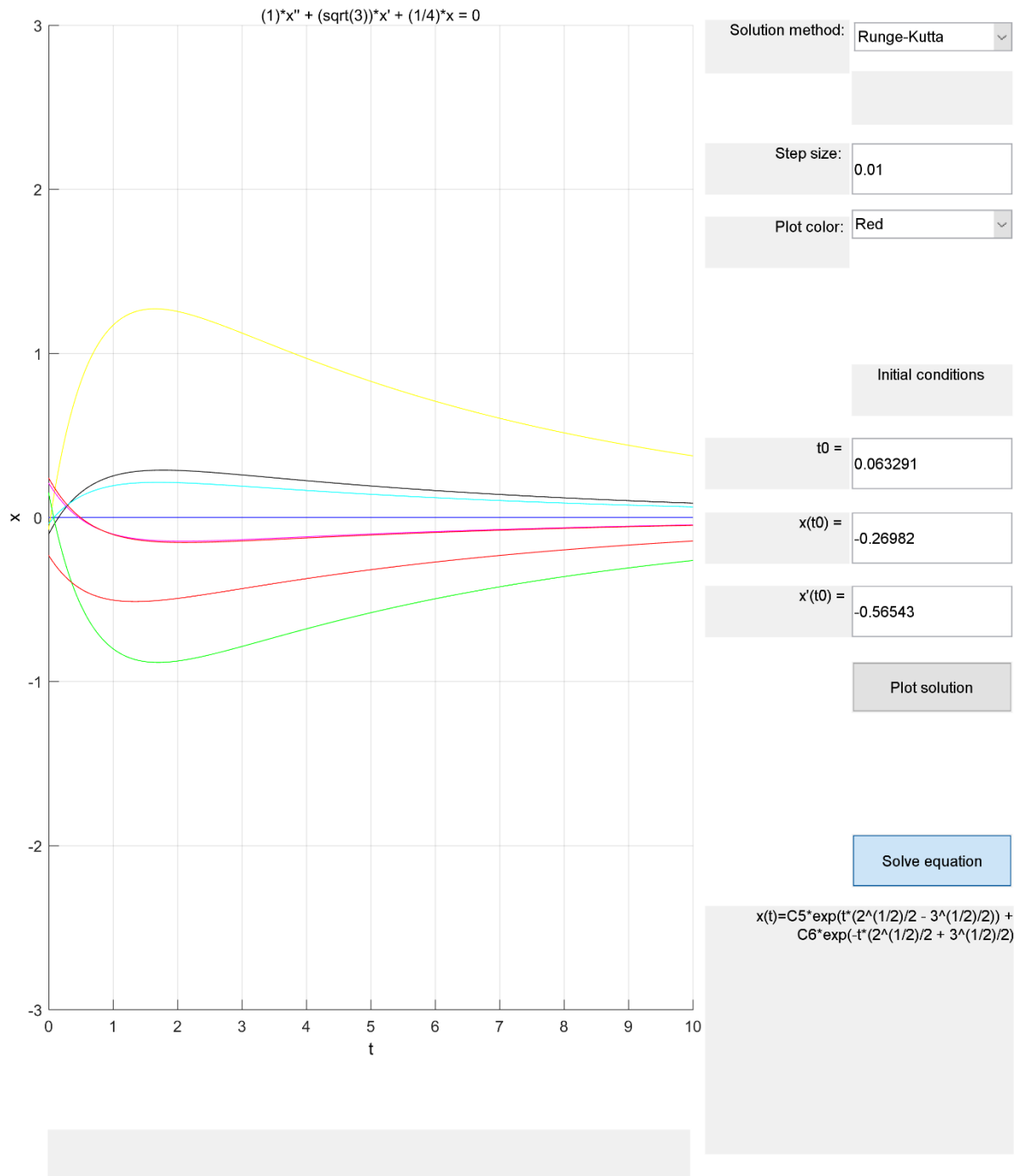


Each of the 6 solutions grow.

b) 100% of solutions grow.

Exercise 3

a)



Each of the 6 solutions are decaying.

b) 100% of the solutions are decaying.

Exercise 4

a)

$$y(t) = c_1 e^{-t} \sin(2t) + c_2 \sin(t) + c_3 e^{-t} \cos(2t) + c_4 \cos(t)$$

b)

If c_2 and c_4 are equal to zero, the solution will decay while oscillating. Otherwise if c_2 and c_4 are both not equal to zero, the limit of the solution as $t \rightarrow \infty$ is neither decaying or growing, it is just oscillating.

Since c_2 and c_4 must be fixed to zero, while c_1 and c_3 can be anything for the solution to decay while oscillating, while c_1 , c_2 , c_3 , and c_4 can be anything for the solution to simply oscillate, the probability for the solution to decay is much lower than the solution to oscillate as $t \rightarrow \infty$. For this reason, I will estimate a 1% probability for the solutions to decay while oscillating, 0% for solutions to grow, grow while oscillating, or decay.

Exercise 7

