Answer Template for Lab 3: Model of a Spring-Mass-Damper

ENGR 232 – Dynamic Engineering Systems

Name: Cole Bardin **Section: 61**

First *Last* *Summer 2022*

Part A: The exact solution

Question 1: Place the roots in this box. Do not use decimals.

Question 1: The roots are: -(2/3)+5i and –(2/3)-5i

Question 2: Find the discriminant *D*.

Question 2: The discriminant is *D* = -8100

Question 3: Exact Solution for y(t).

Question 3: The exact solution is: $3cos(3t)e^{-\frac{2}{3}t}$

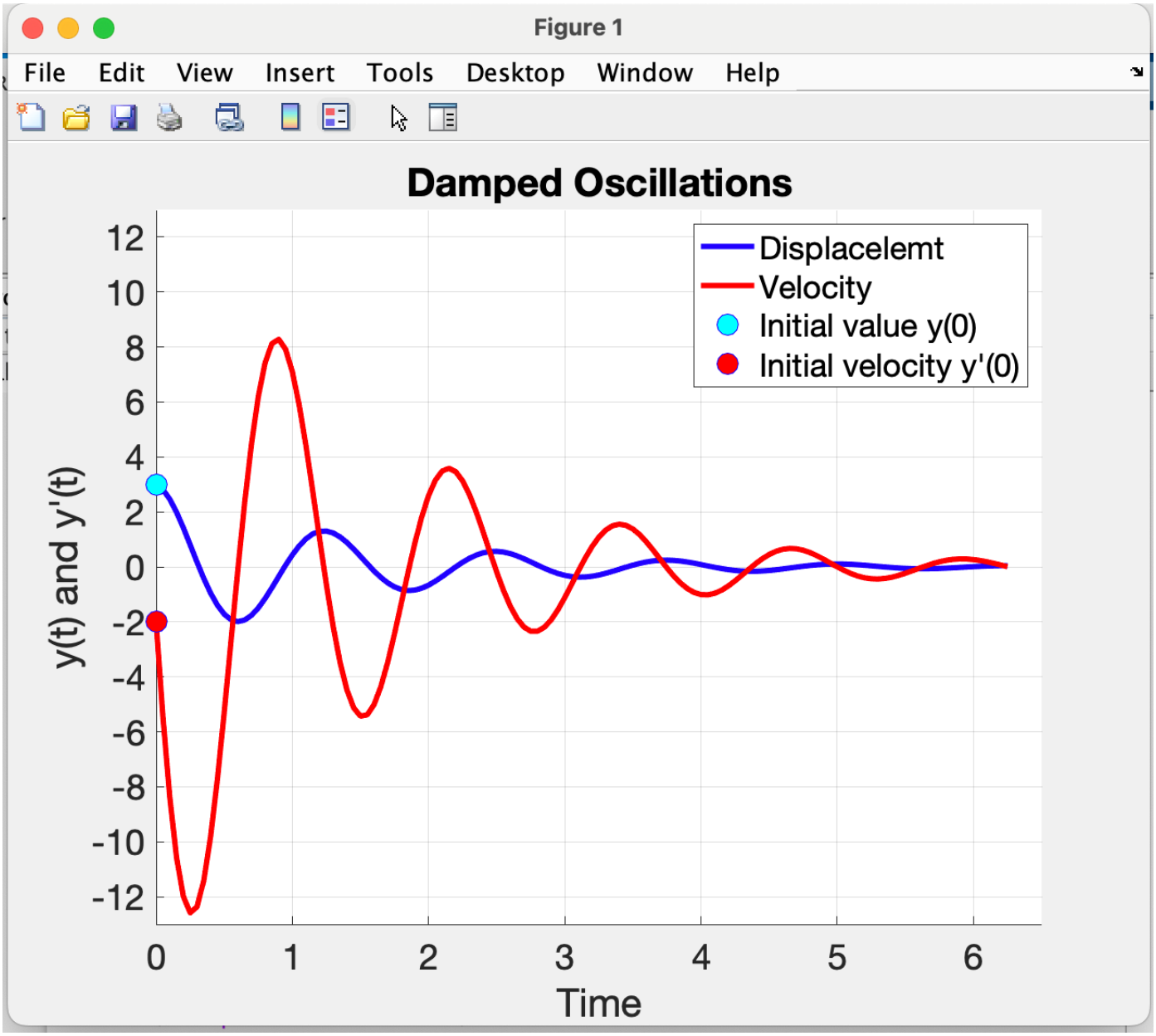
Question 4: Exact Solution for the derivative y'(t).

Question 4: The exact solution for the derivative is:

$$y'(t) = -2cos(5t)e^{-\frac{2}{3}t} - 15sin(5t)e^{-\frac{2}{3}t}$$

Question 5: Replace the sample graph with your completed plot.
Paste your simultaneous plot here.

GRADER - Note **blue** curve must start at +3. Image must **not** have the colorful background seen in the sample. Envelopes are not required.



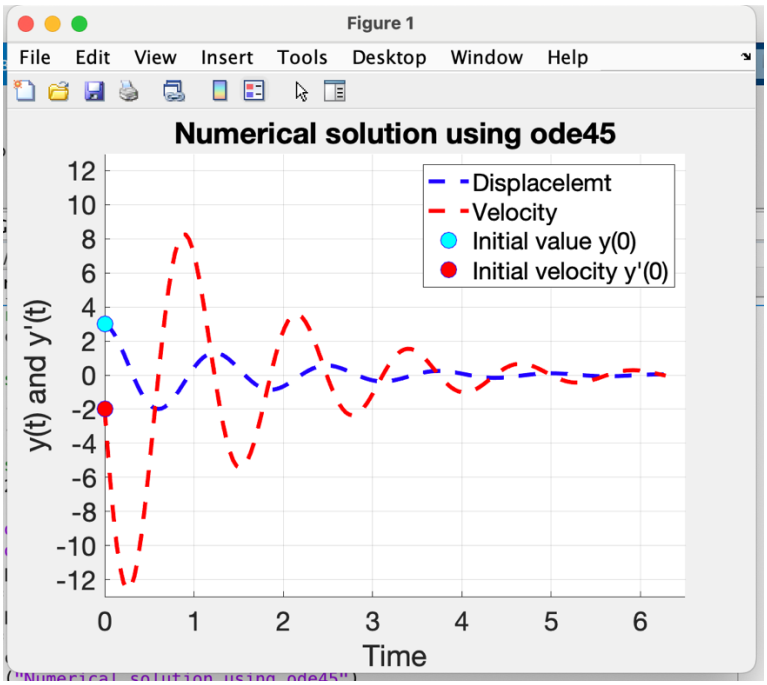
Part B. State Space Representation

Question 6: **Confirm your file smd.m is working by finding** smd(0, x0) with $x0 = \begin{bmatrix} 3 \\ -2 \end{bmatrix}$.

Question 6: The value of smd(0, x0) is: $\begin{bmatrix} -2 \\ -73\frac{2}{3} \end{bmatrix}$

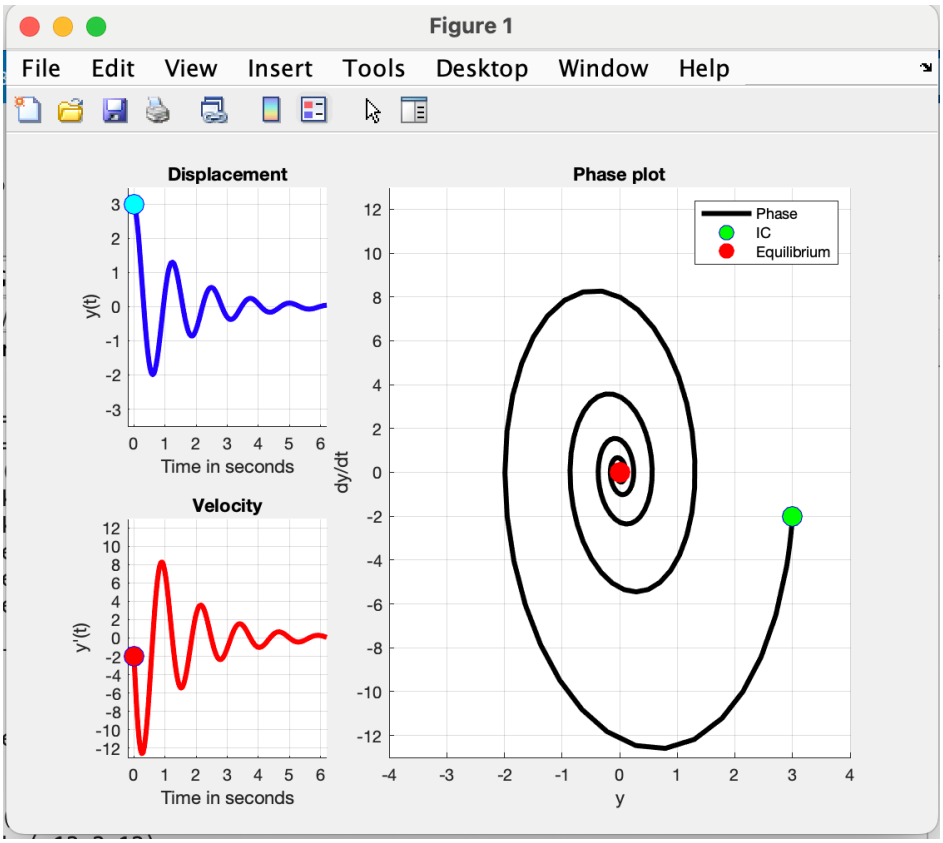
Question 7: **Replace** the sample plot with your completed graph. Your work must **not** contain the footprints left by some mysterious ghost in the machine.

```
GRADER – Envelopes not required!
```



Questions 8, 9 & 10: **Replace** the sample tiled plot with your completed graph. (3 points)

Replace the sample plot with your own tiled plot for points 8-10.




```
GRADER – Make sure the green
dot is at (+3, –2).

Award one point for each of
the three tiles if the graph
there is complete.
```

Be sure all ten questions are answered. When your lab is complete, be sure to submit three files:

1. Your **completed Answer Template** as a PDF file
2. A copy of your **MATLAB Live Script**
3. A **PDF** copy of your **MATLAB Live Script** (Save-Export to PDF…)

The due date is the day after your lab section by **11:59pm** to receive full credit. You have one more day, to submit the lab (but with a small penalty), and then the window closes for good and your grade will be zero.