

EAS 4510

HW 3

Spring 2017

Due April 13th, 2017, at 11:59pm

What Allowed During Examination/HW

You may use any books, your personal notes, or electronic aid, provided that you find the material on your own without having it provided to you by anyone else (either implicitly or explicitly). **You may not, under any circumstances, communicate with anyone about this exam/hw, and that includes me and TAs!**

Any violations of the exam/hw rules will result in further action on my part in a manner consistent with the academic honesty policy of the University of Florida. The academic honesty policy can be found at the Student Conduct and Conflict Resolution website:

<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>

Guidelines for Solutions

Communication is an extremely important part of demonstrating that you understand the material. To this end, the following guidelines are in effect for all problems on the examination/hw:

1. Your handwriting must be neat. I will not try to decipher sloppy handwriting and will assume that something is incorrect if I am unable to read your handwriting.
2. **ONLY FOR IN-CLASS TESTS:** your test must be HANDWRITTEN, no software, no scans, etc., your own handwriting ONLY. If anything else appears other than your own handwriting, the test will be evaluated at 0 (zero).
3. You must be crystal clear with every step of your solution. In other words, any step in a derivation or statement you write must be unambiguous (i.e., have one and only one meaning). If it is ambiguous as to what you mean in a step, then I will assume the step is incorrect.
4. Tests without name on each page, and/or without UFID and signature at the bottom of this page, will not be graded, i.e., they will count as a 0 (zero).
5. ANY assignment (HW, exam, etc.) without signature, date, and UFID at the bottom of this page, will not be graded (i.e., they will receive a score of 0 (zero)).

In short, please write your solutions in an orderly fashion so that somebody else can make sense of what you are doing and saying. Finally, credit will be given only if a relevant concept is applied properly, and no credit will be given for an incorrectly applied concept even if the final answer is correct.

University of Florida Honor Code (only for HW)

On your exam/hw you must state and sign the University of Florida honor pledge as follows:

On my honor, I have neither given nor received unauthorized aid in doing this examination/hw.

Signature:

Date:

University of Florida ID:

Total points: 100

The following requires you to turn in working MATLAB file(s) (i.e., *.m files, no other extensions) that we can run without error. Files should output all required quantities and/or plots. Upload your MATLAB files and additional scanned papers (e.g.: previous page signed) on Canvas, within the deadline. If any required function is missing and/or the files are not *.m, the HW will be returned without grading, and the score will be a zero (0). Neither the TAs or myself will copy-paste from files and/or use functions that you do not include in the deliverable, no matter if those functions are posted on the website or canvas.

1. Complete uncollected HW7. The main matlab script is posted (*uncollected_hw7.m*), and you need to create the missing GVE function. Remember, the GVE function implements the general form of Gauss Variational Equations, and uses J_2 as perturbation. Consider 0 any eccentricity below 10^{-5} in your function converting state vector to orbital parameters. Each correct plot comparing orbital elements obtained from conversion of state vector vs. those obtained from GVEs is 10 points. **[Total 60 points]**
2. In your brand new GVE function add, on top of J_2 , perturbing accelerations in LVLH, one at a time: radial alone 0.001 km/s^2 , tangential alone 0.00001 km/s^2 , normal alone 0.005 km/s^2 . Remember to switch to the function *relacc_with_j2_and_thrust.m*, that you should have developed in uncollected HW6 (posted too). Run the script *uncollected_hw7.m* for the 3 cases. Each full set of 6 plots matching (again, orbital elements from state vector and from GVEs) is 10 points. **[Total 30 points]**

NOTE: for the plots in questions 1 and 2 remember that inverse trigonometric functions give solutions within certain ranges, while the GVEs will give angles that continue to increase/decrease. That is fine, the matching is expected within the inverse trigonometric function interval (we have seen this in class).

3. Complete uncollected HW9. What is the relative initial condition of deputy vs chief in LVLH? **[10 points]**

EXTRA CREDIT [5 pts] In which conditions the solar radiation pressure cannot be used to control a satellite?