Academic Misconduct

Academic misconduct includes all acts of dishonesty in any academic or related matter and any knowing or intentional help, attempt to help, or conspiracy to help another student commit an act of academic dishonesty. Academic dishonesty includes, but is not limited to, the following acts, when performed in any type of academic or academically related matter, exercise, or activity:

- Cheating: Using or attempting to use unauthorized materials, information, study aids, or computer-related information.
- Plagiarism: Representing the words, data, works, ideas, computer programs or output, or anything not generated in an authorized fashion, as one's own.
- Fabrication: Presenting as genuine, any invented or falsified citation or material.
- Misrepresentation: Falsifying, altering, or misstating the contents of documents or other materials related to academic matters, including schedules, prerequisites, and transcripts.

The complete Academic Integrity Policy may be found online at studenthandbook.ua.edu/conduct.html.

Academic Honor Pledge

Please sign the Academic Honor Pledge prior to starting the exam. The Academic Honor Pledge reads as follows: I promise or affirm that I will not at any time be involved with cheating, plagiarism, fabrication, or misrepresentation while enrolled as a student at The University of Alabama. I have read the Academic Honor Code, which explains disciplinary procedures that will result from the aforementioned. I understand that violation of this code will result in penalties as severe as indefinite suspension from the University.

Signature: ______________________________

Problem 1

Recall the first homework. Provided a set of observations and incorrect initial state the Newton-Raphson root-finding method was used to determine the correct initial state.

1. Create an ephemerides of two satellites orbiting a central body (two-body) and adding a random number, $1 > X > 0$, to each position coordinate.

2. Using the ground station positions provided determine the single difference and then the double difference and plot both to show the reduction in error.

	Village Observatory	Fake Town
x (m)	-1329998.6780	-1640916.7930
y (m)	-5328393.3870	-5014781.2040
z (m)	3236504.1990	3575447.1420
u (m/year)	-0.0125	-0.0147
v (m/year)	-0.0001	-0.0006
w (m/year)	-0.0065	-0.0084

Problem 2

Part A

Consider a satellite with a beacon transmitting at a known frequency, f_T. The transmitted frequency arrives as the apparent frequency, f_R, and is mixed with the reference frequency f_G.
The Doppler count or number of cycles at the apparent change in transmitted frequency is

$$N_{1,2} = \int_{t_{R1}}^{t_{R2}} (f_G - f_R)\, dt \tag{1}$$

where $t_{R_1} = t_{T_1} + \Delta t_1$ and $\Delta t_1 = \rho_1/c$.
Derive the range-rate and range assuming the ideal case.

Part B

Using the derivations above; determine the Doppler shift over a pass for GPS - L1 (1575 MHz). Assume the satellite is in a posigrade equatorial orbit and the observer is on the equator. Determine Doppler shift at the beginning and end of the pass and when the satellite is at closest approach to the observer.

Problem 3

Determine the GPS receiver clock offset using both the current Topex/Poseidon and GPS position. Ignore the GPS transmitter clock correction. State and justify any assumptions. (Date of receiver measurements is 31 March 1993 02:00:00.000).

GPS PRN	L1 psuedorange (m)
21	-16049870.249
28	-14818339.994

T/P ECF position was:

x (m)	-2107527.21
y (m)	6247884.75
z (m)	-4010524.01

GPS satellites's ECF positions:

	PRN21	PRN28
x (m)	10800116.93	10414902.30
y (m)	23914912.70	13538107.48
z (m)	1934886.67	-20329185.40