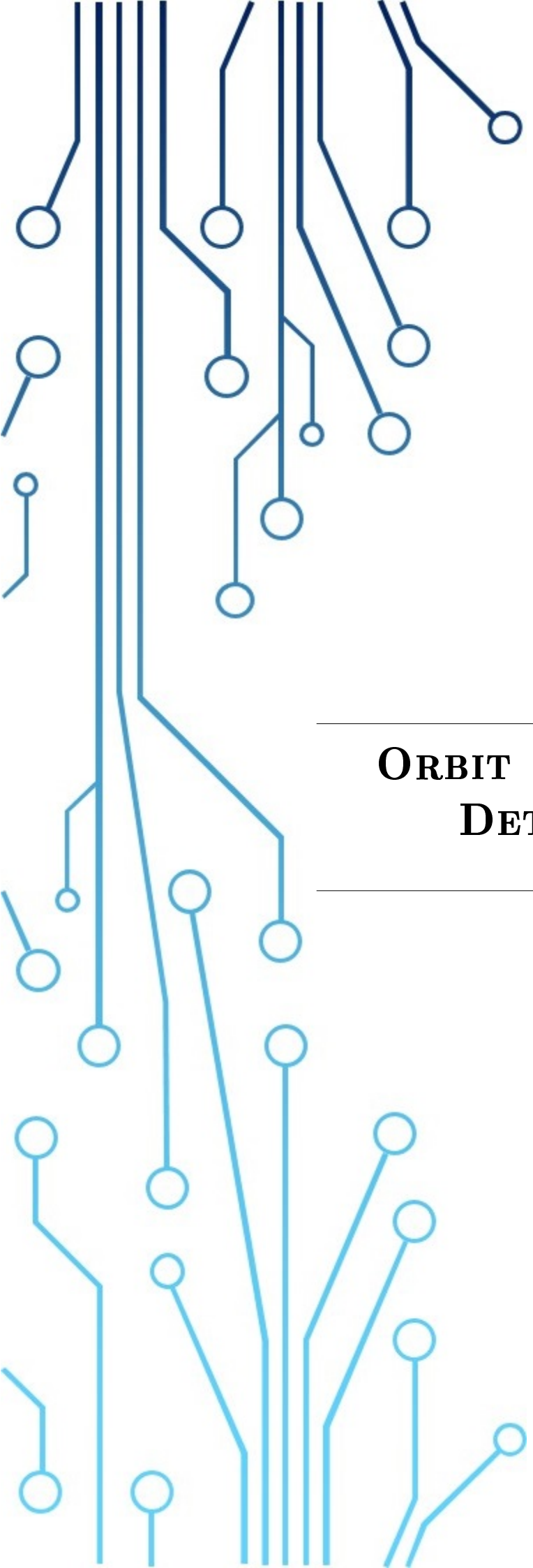

Space Engineering 3
Assignment 1
24th March 2016

Orbit Simulation and Determination

Lydia Drabsch
311217591
ldra3557@uni.sydney.edu.au

THE UNIVERSITY OF SYDNEY

STUDENT PLAGIARISM: COURSE WORK – POLICY AND PROCEDURE

MTRX 2700 COMPLIANCE STATEMENT

INDIVIDUAL / COLLABORATIVE WORK

I/We certify that:

1. I/We have read and understood the *University of Sydney Student Plagiarism: Coursework Policy and Procedure*;
2. I/We understand that failure to comply with the *University of Sydney Student Plagiarism: Coursework Policy and Procedure* can lead to the University commencing proceedings against me/us for potential student misconduct under Chapter 8 of the *University of Sydney By-Law 1999* (as amended);
3. The Work undertaken in this course is substantially my/our own, and to the extent that any part of this Work is not my/our own I/we have indicated that it is not my/our own by Acknowledging the Source of that part or those parts of the Work.

Name	Signature	SID	Date
Melissa Mitrevski		440207636	05/06/2015
Meg Flannery		440291196	05/06/2015
Lydia Drabsch		311217591	05/06/2015

Contents

List of Figures

List of Tables

Introduction

Write an intro here

1. Simulation of Orbits with Classical Elements

1.1 Introduction

- keplers three laws
- perifocal frame
- The true anomaly θ is the angle taken at the focus of the perifocal frame to the satellite from the perigee. The eccentric anomaly E is the angle taken at the centre of perifocal frame to the satellite from the perigee.
-The mean anomaly M_t is the mean number of orbits per day.
- LEO,MEO
-TLE's

1.2 Methodology

From Kepler's second law, the mean anomaly at time t is calculated using the mean motion n from an epoch time described by $M_0(t_0)$.

$$M_t = M_0 + n(t - t_0) \tag{1}$$

To solve for the eccentric anomaly, newtons method was used

$$E_{i+1} = E_i - \frac{f(E_i)}{f'(E_i)} \tag{2}$$

$$E_{i+1} = E_i - \frac{E - e\sin(E_i) - M_t}{1 - e\cos(E_i)} \tag{3}$$

1.3 Results/Discussion

1.3.1 Van Allen Probes

The satellite RBSP-A, also known as the Van Allen Probes, is in a highly eccentric orbit. RBSP-A has a perigee in LEO at an altitude of 596 km and an apogee in MEO at an altitude of 30421 km assuming a spherical Earth.

1.3.2 Orbital Properties

Table 1.1: Orbital Properties - maybe put in classical parameters

Orbital Properties	Van Allen Probe	Other sat
Period		
Altitude at Perigee		
Altitude at Apogee		

2. Simulating Perturbations

2.1 Introduction

2.2 Methodology

2.3 Results/Discussion

3. Orbital Determination

3.1 Introduction

3.2 Methodology

3.3 Results/Discussion

4. Conclusions

References

5. Appendix