Flight Basics Rubric

Title, Team Number, Members, Section, Date – _____/1 point

Abstract – _____/4 points

Measurements and Results
Section 1
Referenced construction plans correctly, web link & date retrieved. – _____/2 point
Documented any variances from plans and reasons – _____/2 point
Static Vent Calculation

Payload Volume = $\pi/4$ x (.935")^2 x 3.1" = 2.1 in^3(approx)

$D_{\text{nom}} = \sqrt{kV}$, where $k = (.25\text{in})^2/(100\text{in})^3 = 0.000625\text{in}^{-1}$

	D_{min} (in)	D_{nom} (in)	D_{max} (in)
1-hole	0.018	0.036	0.073
2-holes	0.013	0.026	0.052
3-holes	0.011	0.021	0.042
4-holes	0.009	0.018	0.036
Final hole size	**0.050 in**		

– _____/4 point
Explained reason hole must be in size range, too small restricts flow and slows time response, too large permits eddy currents and other flow disturbances – _____/1 point
Mass approx 81-to-87 grams (2.9-to-3.1 oz) – _____/2 point
CG from tip of nose approx 14-15 inches (36-to-38 cm) – _____/2 point

Section 2
Recorded battery voltage from first beeps (9 V to 12.5 V) – _____/2 point
Peak altitude recorded (1500 feet to 2500 feet) – _____/2 point
Included printout or plot of data – _____/2 point
Plot resembles actual flight profile – _____/1 point
Peak on plot agrees with peak from beep – _____/1 point
Commented on starting altitude – MSL (Mean Sea Level) and (AGL) Above Ground Level – _____/1 point

Spreadsheet peak agrees with beep peak – _____/1 point
Theory of numerical derivatives – _____/2 point
Numerical velocity and acceleration vs time from spreadsheet – _____/3 point
Comment on noise in velocity and much more in acceleration – _____/1 point
Plot from NumDerivLPFit and reasonable shapes – _____/2 point
Plot from NumDerivSplineFit and reasonable shape – _____/2 point
Comment on improvement over spreadsheet (Spline is usually, but not always better than lowpass, and both better than finite difference) – _____/2 point

Extra Credit
In general, $PV = nRT$. If you pull the syringe quickly, assume reversible adiabatic (isentropic) expansion: $P_2/P_1 = (V_1/V_2)^k$ where $k = C_p/C_v = 1.4$ approx. If you wait long

enough, assume isothermal, $P_2/P_1 = V_1/V_2$. Since $(V_1/V_2)^{1.4} < (V_1/V_2)$ when $V_1<V_2$, the peak won't be affected by how long you wait (although it would be affected by how quickly you pull), but the shape of the descent curve will. If you don't know better, you'll assume the chamber is leaking. – _____/5 point

Section 3

Theory of modeling rocket flight, mass, thrust, drag. – _____/3 point
They should report something from the Rocksim runs, either peak altitudes or graphs or something. – _____/2 point
Ran all three simulations. – _____/4 point
Ran bonus two simulations (C6-5s). – _____/2 bonus point
Varied launch conditions, wind, temperature, starting altitude, relative humidity – _____/1 point

Section 4

Recorded or referenced prep procedure – _____/2 point
Recorded observation latitude, longitude, and altitude for all three observation stations and for launch pad. – _____/2 point
Recorded peak altitude from altimeter for all three launches. – _____/3 point
Recorded azimuth and elevation angles from all three observation sites for all three launches. – _____/3 point
Commented on flight and success of recovery – _____/3 point
Wrote down name and location of downloaded altimeter files – _____/1 point

Section 5

Spreadsheet peak agrees with beep peak – _____/1 point
Theory of inclinometer calculations either trig or vector calculation – _____/2 point
Did one or more inclinometer calculations by hand – _____/2 point
Reported mean and standard deviation numbers from CalcHeight.vi – _____/2 point
Altimeter height is within a standard deviation of mean height from CalcHeight or hand calculations – _____/2 point
Reasonable comments on errors, sources, and estimates – _____/3 point
Theory of numerical derivatives – _____/2 point
Numerical velocity and acceleration vs time from spreadsheet – _____/3 point
Comment on noise in velocity and much more in acceleration – _____/2 point
Plot from NumDerivLPFit and reasonable shapes – _____/2 point
Plot from NumDerivSplineFit and reasonable shape – _____/2 point
Comment on improvement over spreadsheet (Spline is usually, but not always better than lowpass, and both better than finite difference) – _____/2 point
Comparison of measured data with Rocksim data – _____/4 point
Reasonable agreement between measured data and Rocksim data – _____/1 point
Relationship between motor thrust curve and rocket acceleration curve – _____/2 point

References – _____/4 points

Overall Style Layout and Clarity – _____/10 points

Instructor's Discretion – _____/3 points