AE 2790: Homework #6

Due Friday 3/15/2019

1. (6 points) Total power needed

1395 W

2. (6 points) Power design needed

1000 watts

3. (6 points) Mass of power subsystem

525 lbm

4. (6 points) Science instrument(s) needed

2 instruments are needed, the x-ray and the infrared.

5. (6 points) Mass of science instrument(s)

70 lbm

6. (6 points) Power required for science instrument(s)

175 W

7. (6 points) Propulsion design needed

80 lb of thrust

8. (6 points) Mass of the propulsion subsystem

267 lbm

9. (6 points) Power needs of the propulsion subsystem

120 W

10. (6 points) Total mass used

862 lbm

11. (6 points) Total mass of propellant needed

147

12. (6 points) Is 80 lb of thrust generated?

yes

13. (6 points) Is the total mass of power, science, and propulsion less than or equal to 900 lbm?

Yes

862 <900

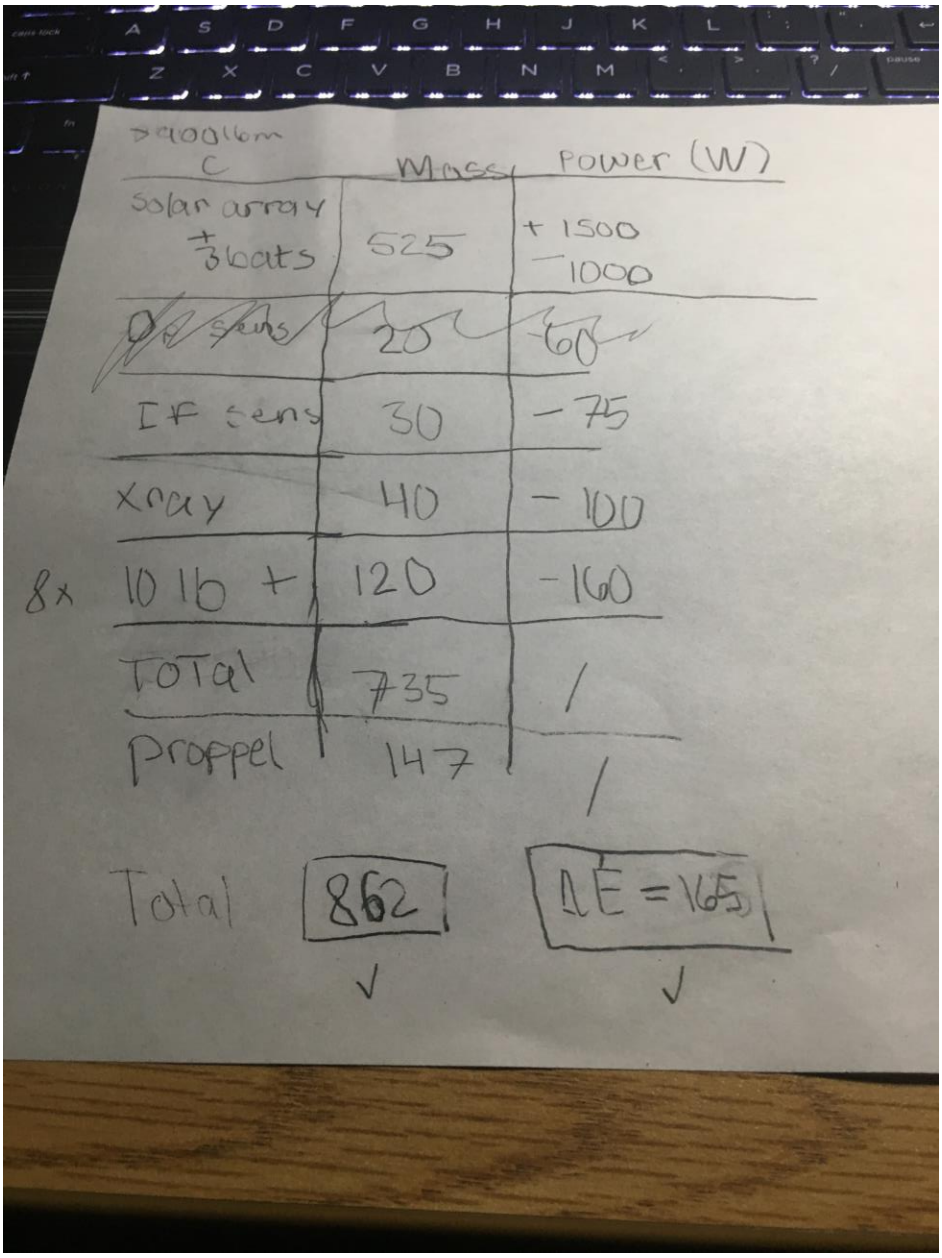
14. (6 points) Are all mission requirements met?

yes

15. (16 points) Write a short paragraph summarizing your design including which power source you used, what

on-board science instruments you will use, and your propulsion system configuration.

The spacecraft will use a solar array: 3 batteries, generating 1500 W. It will use an infrared sensor and an x-ray sensor and 8 10-lb thrusters. The sensors will measure the required wavelengths. The Thrusters provide the 80lb of thrusters.



>900lbm

C	Mass	Power (W)
solar array + 3 batts	525	+1500 −1000
~~O sens~~	20	~~-60~~
IF sens	30	-75
xray	40	-100
8x 10 lb +	120	-160
TOTal	735	/
proppel	147	/

Total 862 ✓

ΔE = 165 ✓