

## HIP 08

### COMMENTS:

- Problem 1 will be graded based off of the HIP rubric.
  - Problem 2 is a list of suggested Student Workbook Volume 1 problems to practice in your spare time. You do not need to turn these in, they will not be graded.
- (1) A spaceship of mass  $2.0 \times 10^6$  kg is cruising at a speed of  $5.0 \times 10^6$  m/s when the antimatter reactor fails, blowing the ship into three pieces. One section, having a mass of  $5.0 \times 10^5$  kg, is blown straight backwards in the negative x direction with a speed of  $2.0 \times 10^6$  m/s. A second piece, with mass  $8.0 \times 10^5$  kg, continues forward at an angle of  $30^\circ$  upward with respect to the original trajectory at  $1.0 \times 10^6$  m/s.
- a. If the original spaceship was traveling in the + x direction. Before mathematically trying to solve this problem, sketch the initial and final momentum vectors of the system and it's individual parts.
    - i. Qualitatively, what direction will the third piece be traveling in after the explosion?
  - b. What is the direction and speed of the third piece?
  - c. Enhancement.
- (2) CH 9: 8, 9, 10, 11, 15, 16, 19, 20, 21, 22