Answers to PH-131 Fall 2009 Exam 1

This document does not contain the solution to each of the problems. It contains only the final answers. Use the exam as a timed practice test and check your *answers*. You may check your *solutions* with any of the TAs.

Remember that you will be graded on your ability to clearly document a formal solution to each problem. All starting equations and algebraic manipulations should be shown clearly. Numbers should be plugged in last. The numbers you are using should be clearly documented. Final answers (with appropriate units) should be boxed or circled. Final answers (even if correct) without an appropriate solution will receive zero credit. If you are not sure how to arrive at the answer to part of a problem, show as much work as possible to receive partial credit. Your work must show a logical progression from one step to the next. Do not write random equations and numbers. It is your responsibility to convince the grader that you know what you are doing.

Multiple Choice Answers:

1) B
2) A
3) E
4) A
5) B
6) A
7) C
8) B
9) D
10) C

Problem 1: For the given reference frame:

    a) At 15 s they are 75 m apart.
    b) - 2.0 m/s^2 (taking an additional 15 s to stop)
    c) 450 m
    d) See a TA for graphs.

       BONUS: 1.0 s and 19 s

Problem 2: For the given reference frame:

    a) At maximum height (t = 5.31 s):

       position: $\vec{r} = \left(141\hat{i} + 158\hat{j}\right)m$, so distance from origin is 212 m

       velocity: $\vec{v} = \left(-30\hat{i}\right)\dfrac{m}{s}$, so speed is 30 m/s

b) When $x_{arrow} = 0$, $t = 10.0$ s. At this time $y_{arrow} = 50.0$ m. So the balloon will reach the same vertical height ($y_{balloon} = 50.0$ m) in the same time if it accelerates at 1.0 m/s^2

c) Average velocity of arrow during the first 10.0 s: $\bar{v} = \left(-30\hat{i} + 3.0\hat{j}\right)\dfrac{m}{s}$

BONUS: 4.4 s (Note the egg has an upward velocity after the arrow strikes the balloon).