

Spring Break Homework MAC-2311 Spring 2015 Name: _____

Due date: Tuesday, March 17. To receive credit you MUST SHOW ALL YOUR WORK.

1. (5 pts) Find the coordinates of a point in the first quadrant at which the tangent line to the curve $x^3 - xy + y^3 = 0$. You may confirm your answer by graphing the curve using wolframalpha.com .

2. (5 pts) Two cars start moving from the same point. One travels south at 60 mi/h and the other travels west at 40 mi/h. At what rate is the distance between the cars two hours later?

3. (10 pts) A plane traveling horizontally at 300 ft/s over flat ground at an elevation of 9600 ft releases an emergency packet. The trajectory of the packet is given by the parametric curve

$$x = 300t, \quad y = -16t^2 + 9600, \quad \text{for } t \geq 0,$$

where the origin is the point on the ground directly beneath the plane at the moment of the release, and t is the time in seconds since the moment of release.

(a) (4 pts) Graph the trajectory of the packet and find the coordinates of the point where the packet lands.

(b) (3 pts) Find dx/dt , dy/dt , explain their practical meaning and why the formulas you got for each of them makes sense.

(c) (3 pts) Find the angle at which the released package hits the ground.