PreCalc A Parametric Equations Worksheet 1

1. Vertical projectile Motion: Bob throws a ball straight up with an initial velocity of 50 feet per second from a height of 6 feet.

a) Write parametric equations that model the path of the ball as a function of time.

$x = 2$

$y = -16t^2 + 50t + 6$

b) How long is the ball in the air?

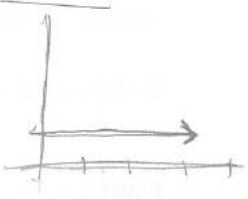
3.24 sec

c) When is the ball at its maximum height? 1.6 sec

d) What is the maximum height? 45 ft

2. Catching a Train. A train leaves at 8:06 AM and accelerates at the rate of 2 meters per second per second. The position , s, at time ,t, of an object having acceleration a is $s = \frac{1}{2}at^2$

$s = \frac{1}{2}(2)t^2$



a.) Write parametric equations to model the motion of the train

$x(t) = t^2$

$y(t) = 2$

Bill, who can run 5 meters per second, arrives at the train station 5 seconds after the train has left and runs after it.

b) Write parametric equations to model the motion of Bill.

$x(t) = 5(t-5)$

$y(t) = 1$

c) Will Bill catch the train?

No

3. Projectile Motion Khris Davis throws a baseball with an initial velocity of 115 feet per second at an angle of 20° to the horizon. The ball leaves his hand at a height of 6 feet.

a) Write parametric equations to model the path of the ball.

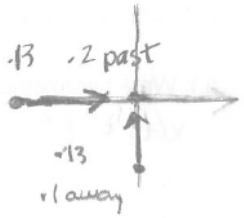
$x(t) = 115t\cos(20)$

$y(t) = -16t^2 + 115t\sin(20) + 6$

b) How long is the ball in the air? 2.6

c) Assuming that the throw is on target, if Khris was 270 feet away from home plate when making the throw, will the catcher be able to catch the ball? Yes @ 2.5 sec ball is 270.1 ft and height 4.33 ft

4. Criss Cross Crash? A Toyota Camry traveling east at 40 mph and a Chevy Impala traveling north at 30 mph are heading towards the same intersection. The Camry is 5 miles from the intersection when the IMpala is 4 miles from the intersection.



a) Find parametric equations that model the motion of the Camry:

$x(t) = -5 + 40t$

$y(t) = 0$

Find parametric equations that model the motion of the Impala:

$x(t) = 0$

$y(t) = -4 + 30t$

b) Graph both sets of equations simultaneously .13 sec (.2,0) (0,.1) $\sqrt{.2^2 + .1^2} = .22$ mile

c) Estimate how close the cars get. $\approx$ .22 miles

d) Algebraically write an equation for the distance between the cars as a function of time.

$\sqrt{(-5+40t)^2 + (-4+30t)^2}$

e) In function mode, graph the distance equation you came up with and calculate the minimum distance between the cars.

.128 hrs

.2 Miles