Module 6 Review

Int. Math 3 Honors

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1. Graph the parametric equation and write it in rectangular form.

$x(t) = t - 2$ $\quad y=$

$y(t) = t^3 + 1$

$x+2=t$

$y = (x+2)^3 + 1$

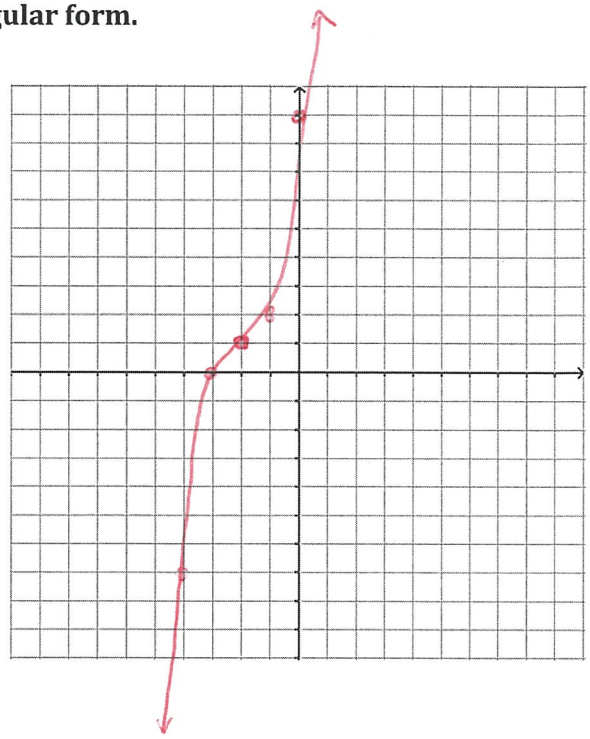
y-int $(0, 9)$

x-int $0 = (x+2)^3 + 1$

$-1 = (x+2)^3$

$-1 = x + 2$

$-3 = x$

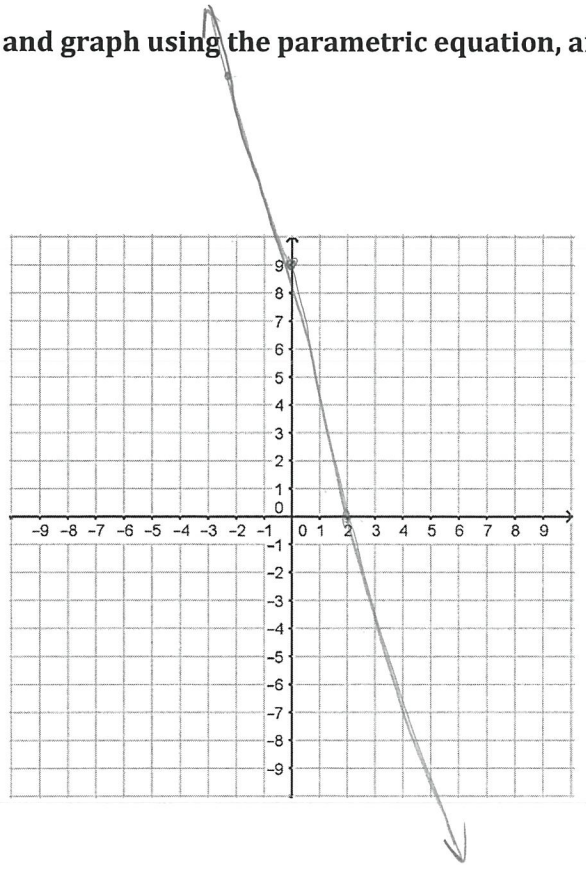


2. Complete the table and graph using the parametric equation, and write it in rectangular form.

$x = -2\cot^2(\theta)$

$y = 9\csc^2(\theta)$

θ	x	y
-45	-2	18
0	UND	UND
45	-2	18
90	0	9
135	-2	18
180		
225		



Algebraically derive the **rectangular equation** for the given parametric equation. Show all work!

$\frac{\sin^2}{\sin^2} + \frac{\cos^2}{\sin^2} = \frac{1}{\sin^2}$

$1 + \cot^2 = \csc^2$

$1 + \frac{x}{-2} = \frac{y}{9}$

$y = -\frac{9}{2}x + 9$

3. Luna and Shultis are running around Balboa Park on the weekend. They both don't look at their surroundings much while they are running so they have a high risk of running into anyway in their path. Their paths are modeled by the parametric equations below.

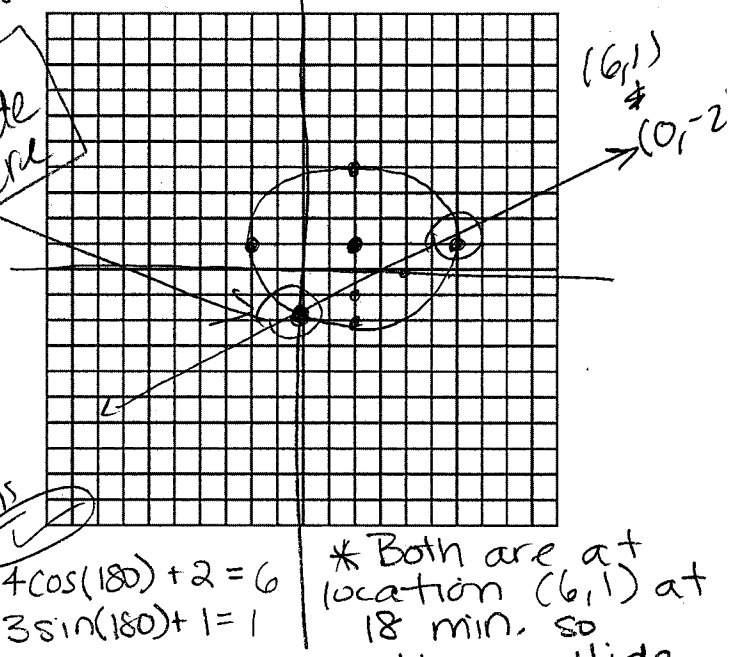
Will they run into each other?

Explain using mathematical reasoning and include any location and time(s)

***USE DEGREES

$x_L(t) = \frac{1}{6}t + 3$ and $x_S(t) = -4cos10t + 2$

$y_L(t) = \frac{1}{12}t - \frac{1}{2}$ and $y_S(t) = -3sin10t + 1$



$6(x-3) = t$

$\frac{(x-2)^2}{16} + \frac{(y-1)^2}{9} = 1$

$\frac{6(x-3)}{12} - \frac{1}{2}$

Luna: ✓

$6 = \frac{1}{6}t + 3$

$3 = \frac{1}{6}t$

$18 = t$

$1 = \frac{1}{12}t - \frac{1}{2}$

$\frac{3}{2} = \frac{1}{12}t \quad t = 18$

$y = \frac{1}{2}x - \frac{3}{2} - \frac{1}{2}$

$y_L = \frac{1}{2}x - 2$

Shultis ✓

$-4\cos(180) + 2 = 6$

$-3\sin(180) + 1 = 1$

*Both are at location (6,1) at 18 min. so they collide

4. Convert the following from parametric to rectangular.

$\frac{x+5}{2} = t$

a. $\begin{cases} x(t) = 2t - 5 \\ y(t) = 2t^2 - 3t + 4 \end{cases}$

$y = 2\left(\frac{x+5}{2}\right)^2 - 3\left(\frac{x+5}{2}\right) + 4$

$\sin^2 + \cos^2 = 1$

$\tan^2 + 1 = \sec^2$

b. $\begin{cases} x = 2tant + 3 \\ y = 4sec^2 t - 1 \end{cases}$

$\frac{(x-3)^2}{4} + 1 = \frac{y+1}{4}$

$(x-3)^2 + 4 = y + 1$

$y = (x-3)^2 + 3$

c. $\begin{cases} x = \sqrt[3]{t-3} \\ y = -6t^3 + 5t \end{cases}$

$x^3 + 3 = t$

$y = -6(x^3+3)^3 + 5(x^3+3)$

5. Convert the following from rectangular to parametric. (YOU MAY NOT USE x(t) = t or y(t) = t)

a. $y = 2x^2 - 6$

[MANY ANSWERS]

$\begin{cases} x(t) = 2t \\ y(t) = 2(2t)^2 - 6 \end{cases}$

or

$8t^2 - 6$

b. $\frac{(x+2)^2}{36} - \frac{(y-1)}{4} = 1$

$\begin{cases} x(t) = 6\cos t - 2 \\ y(t) = -4\sin^2 t + 1 \end{cases}$