ENGR 222
Assignment 1 Submission

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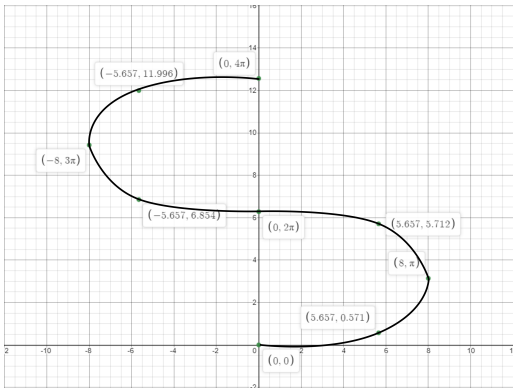
1. Consider the parametric equations: $(x, y) = (8sin(t), 2t - sin(2t))$

(a)
$$(x, y) = [(0, 0), (5.657, 0.571), (8, \pi), (5.657, 5.712), (0, 2\pi), (-5.657, 6.854), (-8, 3\pi), (-5.657, 11.996), (0, 4\pi)]$$



(b)
$$\frac{d}{dt}(x, y) = (8cos(t), 2 - 2cos(2t))$$
$$t = \pi/6 \ : \ \frac{d}{dt}(x, y) = (6.928203, 1)$$

Unit tangent vector:
$$\frac{\frac{d}{dt}(x, y)}{\|\frac{d}{dt}(x, y)\|} = \frac{(6.928203, 1)}{\sqrt{6.928203^2 + 1}} = \left(\frac{6.928203}{7}, \frac{1}{7}\right)$$

(c)
$$= (x, y) + t \cdot \frac{\frac{d}{dt}(x, y)}{\|\frac{d}{dt}(x, y)\|}$$
$$= (4, 0.181) + t\left(\frac{6.928203}{7}, \frac{1}{7}\right)$$
$$= \left(\frac{6.928203t}{7} + 4, \frac{t}{7} + 0.181)\right)$$

(d) Normal line:
$$= \left(f(\frac{\pi}{6}) - tg'(\frac{\pi}{6}), g(\frac{\pi}{6}) + tf'(\frac{\pi}{6})\right)$$
$$= (4 - t, 0.181 + 6.928203t)$$

(e)

2. Consider the curve described by the vector valued function:

   (a)
   (b)
   (c)
   (d)
   (e)

3. Quick questions:

   (a)
   (b)
   (c)
   (d)
   (e)

4. Suppose a roller coaster path described by:

   (a)
   (b)
   (c)
   (d)
   (e)