Arts & Science 1D06 Quiz #11

March 14, 2016

Full Name: SOLUTIONS Student # :

TA: MADDIE

Please provide detailed solutions to the problems below. Correct responses without justification may not receive full credit. The use of a calculator is permitted.

[6 marks] (1.) Determine the (x, y) coordinates where the following parametric curve has
a) horizontal tangent lines
b) vertical tangent lines

$$x = t^3 - 3t, \quad y = 3t^2 - 9$$

a) $\frac{dy}{dt} = 6t$

$6t = 0$

$t = 0$

when $t=0$,

$x = 0, y = -9$

⇒ horizontal tangent at $(0, -9)$

b) $\frac{dx}{dt} = 3t^2 - 3$

$3t^2 - 3 = 0$

$t^2 = 1$

$t = \pm 1$

when $t = 1$:

$x = -2, y = -6$

when $t = -1$

$x = 2, y = -6$

⇒ vertical tangents at $(2, -6)$ and $(-2, -6)$

[4 marks] (2.) Sketch the parametric curve for the set of parametric equations in (1.) for $-2 \le t \le 2$

t	x	y
-2	-2	~~-6~~ 3
-1	2	-6
0	0	-9
1	-2	-6
2	2	3

- passes through $(0,0)$ when $t = \pm\sqrt{3}$