Math 2433-001 Quiz I Name: SOLUTIONS

**Q1]..** Suppose that the parametric curve $x = f(t)$, $y = g(t)$ is such that $g'(1) = 0$. Is it true that the curve **must** have a horizontal tangent line at the point $(f(1), g(1))$? Explain your answer.

$$\left.\frac{dy}{dx}\right|_{t=1} = \frac{\left.\frac{dy}{dt}\right|_{t=1}}{\left.\frac{dx}{dt}\right|_{t=1}} \quad \text{... really} \quad \lim_{t\to 1} \frac{g'(t)}{f'(t)}$$

If $f'(1) \neq 0$ then $\frac{g'(1)}{f'(1)} = 0$ & we have horizontal ~~slope~~ tangent.

If $f'(1) = 0$, then we need to compute Limit

eg $g'(t) = t^2 - 1$, $f'(t) = t - 1$ $\Rightarrow$ $\lim_{t\to 1} \frac{g(t)}{f'(t)} = \lim_{t\to 1} \frac{t^2-1}{t-1}$

$= \lim_{t\to 1} (t+1) = 2$

$g(t) = \frac{t^3}{3} - t + 7$

$f(t) = \frac{t^2}{2} - t + 4$

parametric curve with tangent slope 2 at the point $(f(1), g(1))$.