Quiz 2

Problem 1 Suppose that a particle is following

$$\mathbf{r}(t) = \langle t^2, t^3 - 4t, 0 \rangle$$

and that it flies off on a tangent at time $t = 2$ seconds. Where is it one second later?

$$\vec{r}\,'(t) = \langle 2t, 3t^2 - 4 \rangle$$

Tangent line at $t = 2$ has direction

$$\langle 4, 8, 0 \rangle$$

and ~~is at~~ goes through the point $\langle 4, 0, 0 \rangle$

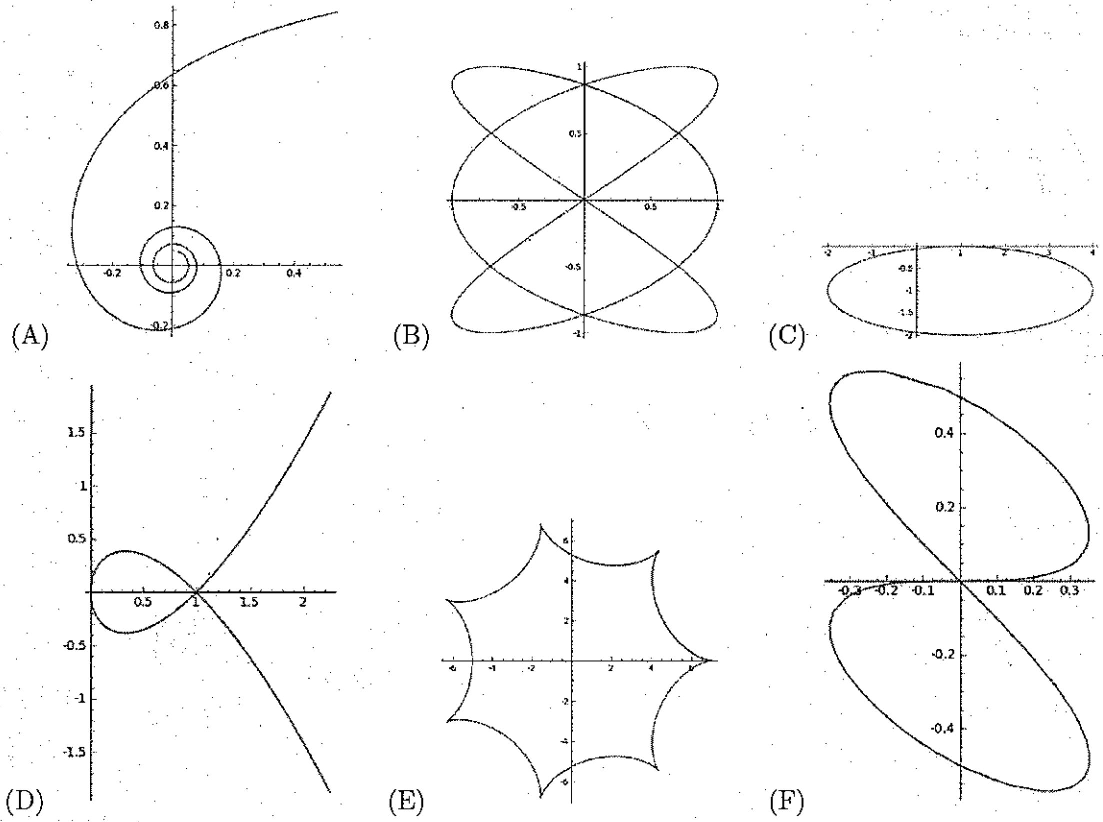
So its equation is

$$\vec{l}(t) = \langle 4, 0, 0 \rangle + t \langle 4, 8, 0 \rangle$$

← different t. at $t = 0$ the particle is on on the curve and the tangent line

At time 1 it's at $\boxed{\langle 8, 8, 0 \rangle}$.

Problem 2 Match the equations with their graphs. One graph doesn't match with one parameterization. Identify which one doesn't and sketch the correct curve corresponding to that parameterization. Justify your answers. "Process of elimination" is not an acceptable justification. Assume that all parameterizations go for all t.



F $a(t) = \langle \frac{t^3-t}{t^4+1}, \frac{t}{t^4+1} \rangle$

goes through the origin, and through the point $(0, \frac{1}{2}.)$ ~~so it~~

C $b(t) = \langle 3\sin t + 1, \cos t - 1 \rangle$ $= \langle 3\sin t, \cos t \rangle + \langle 1, -1 \rangle$

ellipse where the x goes from $-3, 3$ and y from -1 to 1 shifted by $\langle 1, -1 \rangle$

E $c(t) = \langle 6\cos(t/7) + \cos(6t/7), 6\sin(t/7) - \sin(6t/7) \rangle$

$-\frac{6}{7}\sin(t/7) - 6\sin(\frac{6t}{7})$, $\frac{6}{7}\cos(t/7) - \frac{6}{7}\cos t\frac{7}{6}$ a cusp at $t = 0$, so

B $d(t) = \langle \cos(3t), \sin(2t) \rangle$ at the point $(1,0)$ there's a vertical tangent

$\langle -3\sin 3t, 2\cos 2t \rangle$ @ $t = 0$ $v(t) = \langle 0, 2 \rangle$.

C ~~$e(t) = \langle t(t-1), t(t-1)(t-2) \rangle$~~

A $f(t) = \langle \frac{\cos(t)}{t}, \frac{\sin(t)}{t} \rangle$

$\langle \cos t, \sin t \rangle$ is a circle and the $\frac{1}{t}$ as $t \to 0$ makes the curve get bigger, $t \to \infty$ small so