Curves in $\mathbb{R}^2$ and $\mathbb{R}^3$- HW Problems

1. Sketch the curve represented by

a. $x = 2\cos(t) \qquad 0 \le t \le 2\pi$

$y = 2\sin(t)$

b. $x = 2\cos(t) \qquad 0 \le t \le 2\pi$

$y = 2\sin(t)$

$z = t$

2. Find parametrizations for the following curves.

a. The line through $(-2, 1, 1)$ and $(2, 2, -2)$

b. $x^2 + y^2 = 9$ in $\mathbb{R}^2$

c. $y = 9 - x^2$ in $\mathbb{R}^2$

d. $x = y^3 + 2y - 1$ in $\mathbb{R}^2$

3. Find a unit tangent vector to $\vec{c}(t) =< \cos(2t), \sin(2t), t >$ at $t = \frac{\pi}{8}$. Write an equation of the tangent line to $\vec{c}(t)$ at $t = \frac{\pi}{8}$.

4. A particle is travelling along a path given by $\vec{c}(t) =< e^{-t}, e^{t}, \sin(t) >$. At time $t = 1$ the particle flies off along the tangent to the curve at that point. Find the position of the particle at $t = 2$.