9.1 & 9.2 Handout

1 e)

$\frac{dx}{dt} = \frac{1}{2}$; $\frac{dy}{dt} = 2t$

$\frac{1}{2} \neq 0$

$2t = 0$

$t = 0$

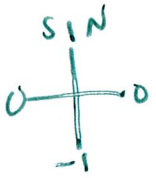
$x(0) = 0$; $y(0) = 1$

horizontal tangent line @ $(0, 1)$

2 e) $\frac{dx}{dt} = -3\sin t$; $\frac{dy}{dt} = 4\cos t$

$-3\sin t = 0$

$\sin t = 0$



$t = 0, \pi$; $[0, 2\pi)$

Vertical Tangent Line

$x(0) = 3\cos(0) = 3 \cdot 1 = 3$

$y(0) = 4\sin(0) = 4 \cdot 0 = 0$

$(3, 0)$

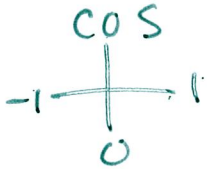
$x(\pi) = 3\cos(\pi) = 3 \cdot -1 = -3$

$y(\pi) = 4\sin(\pi) = 4 \cdot 0 = 0$

$(-3, 0)$

$4\cos t = 0$

$\cos t = 0$



$t = \pi/2, 3\pi/2$; $[0, 2\pi)$

Horizontal Tangent Lines

$x(\pi/2) = 3\cos(\pi/2) = 0$

$y(\pi/2) = 4\sin(\pi/2) = 4$

$(0, 4)$

$x(3\pi/2) = 3\cos(3\pi/2) = 0$

$y(3\pi/2) = 4\sin(\frac{3\pi}{2}) = -4$

$(0, -4)$

9.1 & 9.2 Handout

3e)

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

$3t^2 = 0$

$t = 0$

$\frac{dy}{dt} = 2t$

$2t = 0$

$t = 0$

Singular Point

$x(0) = 0^3 = 0$; $y(0) = 0^2 = 0$

$\boxed{(0,0)}$