

Name: _____ ID: _____ Section: _____

Direction: Show your work in the space provided. Partial credit will be given. This is a closed-book test. No crib sheets or calculators are allowed. You have 10 minutes to finish the quiz. Good luck!!

1. a) Find the equation for phase-plane trajectories of

$$\begin{aligned}x' &= y, \\y' &= -x.\end{aligned}$$

(8 points)

Solve the differential equation

$$\frac{dy}{dx} = \frac{dy/dt}{dx/dt} = \frac{-x}{y}$$

$$\int y dy = - \int x dx$$

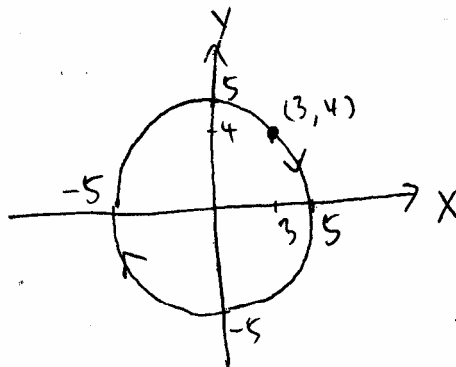
$$\frac{y^2}{2} = -\frac{x^2}{2} + c$$

The equation for trajectories is

$$x^2 + y^2 = c$$

where c is an arbitrary constant.

- b) With an initial condition $x(0) = 3$, $y(0) = 4$, plot the trajectory on the phase-plane. (4 points)



$$X^2 + Y^2 = X(0)^2 + Y(0)^2 = 25$$