Spring 2004 AMS501: Homework #3
Due on Feb 27, 2004

1. 3.1.10 *Solution:* $x = Ce^{4t} - 1/4$, $y = De^{t}$.

2. 3.1.15 *Solution:* $x = \pm\sqrt{t^2 + C}$, $y = De^{\pm\frac{1}{3}(t^2+C)^{3/2}}$

3. 3.2.2 *Solution:*

4. 3.2.13 (a) *Solution:*

5. 3.4.2 Drawing orbits is optional. *Solution:* x-nulclines: $x = 0$, $y = -x$. y-nullclines: $y = 0$, $y = 2x$. $(0, 0)$ is a stationary point.

6. 3.4.13 *Solution:* $x^2y + 1/3y^3 = C$

7. 3.4.16 *Solution:* A nonautonomous system of two ODEs

$$\begin{aligned} \frac{dx}{dt} &= f(t, x, y) \\ \frac{dy}{dt} &= g(t, x, y) \end{aligned}$$

can be treated as an aunormous sytem of three ODEs

$$\begin{aligned} \frac{ds}{dt} &= 1 \\ \frac{dx}{dt} &= f(s, x, y) \\ \frac{dy}{dt} &= g(s, x, y). \end{aligned}$$