Name

Dynamical Systems Quiz-9 Key

Instructions. Be sure to indicate how you got your answers.

- 1. Consider $\frac{dx}{dt} = \frac{1}{2}x \frac{x^2}{4}$
 - (a) Sketch the one-dimensional phase line.

(b) Sketch the time-dependent solution qualitatively.



- (c) Determine long-term behavior $\lim_{t\to\infty} x(t)$ for the solution with the initial value x(0) = 1. $\lim_{t\to\infty} x(t) = 2$
- (d) Obtain the exact solution.

There are many forms of the answer. One of them is $x(t) = \frac{2e^{t/2}}{e^{t/2}+C}$. When x(0) = 1 this gives $x(t) = \frac{2e^{t/2}}{e^{t/2}+1}$.

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Dynamical Systems Quiz-9 Key

Instructions. Be sure to indicate how you got your answers.

- 1. Consider $\frac{dx}{dt} = \frac{1}{2}x \frac{x^2}{6}$
 - (a) Sketch the one-dimensional phase line.
 - (b) Sketch the time-dependent solution qualitatively.



- (c) Determine long-term behavior $\lim_{t\to\infty} x(t)$ for the solution with the initial value x(0) = 1. $\lim_{t\to\infty} x(t) = \frac{3}{2}$
- (d) Obtain the exact solution.

There are many forms of the answer. One of them is $x(t) = \frac{3e^{t/2}}{e^{t/2}+C}$. When x(0) = 1 this gives $x(t) = \frac{3e^{t/2}}{e^{t/2}+2}$.

Dynamical Systems Quiz-9 Key

Instructions. Be sure to indicate how you got your answers.

- 1. Consider $\frac{dx}{dt} = \frac{1}{3}x \frac{x^2}{6}$
 - (a) Sketch the one-dimensional phase line.
 - (b) Sketch the time-dependent solution qualitatively.



- (c) Determine long-term behavior $\lim_{t\to\infty} x(t)$ for the solution with the initial value x(0) = 1. $\lim_{t\to\infty} x(t) = 2$
- (d) Obtain the exact solution.

There are many forms of the answer. One of them is $x(t) = \frac{2e^{t/3}}{e^{t/3}+C}$. When x(0) = 1 this gives $x(t) = \frac{2e^{t/3}}{e^{t/3}+1}$.