Math 116 Quiz 5: § 11.1-11.6 (Differential Equations) **Tue 23 Oct 2012**
Name: _____

You have 30 minutes to complete this quiz. Eyes on your own paper and good luck!

1. **Definitions/Concepts.** (1 pt ea) Consider a differential equation of the form

$$\frac{dH}{dt} = k(H - C),$$

where k and C are constants.

(a) This is a _____ order differential equation.

(b) What is the general solution to this equation?

(c) What is the equilibrium solution to this equation?

2. **Questions/Problems.**

A box is dropped from an airplane. The downward veleocity $v(t)$ of the box, once its parachute opens, satisfies the differential euqation

$$\frac{dv}{dt} = 10 - \frac{1}{10}(1 + e^{-t})v^2.$$

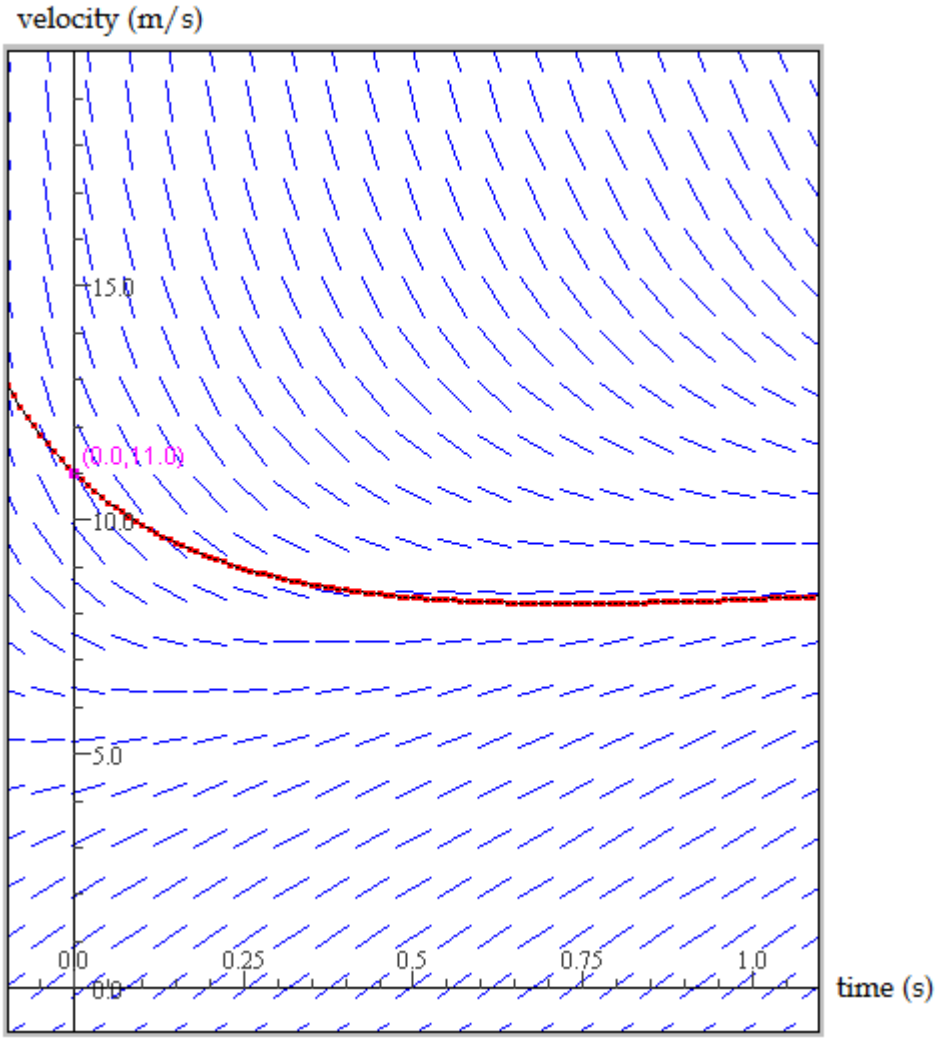
(a) (3 pts) Suppose the parachute opens when the velocity of the box is 11 m/s. Use Euler's method with three steps to approximate the velocity of the box one second after the parachute opens.

t	$v(t)$	dv/dt	Δv

What does your estimate say the velocity is after 1 second?

MORE QUIZ ON THE BACK –>

(b) (2 pts) Draw your Euler approximation on the following slope field:



(c) (2 pts) Say something **about slope fields** to argue whether your approximation is an overestimate or an underestimate.

3. **Computations/Algebra.** (1 pt ea) Find the solutions to the following differential equations subject to their given initial conditions.

(a) $\frac{dy}{dx} + \frac{y}{3} = 0, \quad y(0) = 10$

(b) $2\frac{du}{dt} = u^2, \;\; u(0) = 1$

(c) $\frac{dz}{dy} = zy, \;\; z = 1$ when $y = 0$

(d) $\frac{dz}{dt} = te^z, \quad$ through the origin

(e) $\frac{dw}{d\theta} = w + w\theta^2, \; w = 5$ when $\theta = 0$