MATH 320, Spring 2013, Assignment 2

Textbook Questions

Section 1.3, #13, 14 Determine whether existence of at least one solution of the given initial value problem is guaranteed and, if so, whether uniqueness of that solution is guaranteed:

13: $\dfrac{dy}{dx} = \sqrt[3]{y}; \quad y(0) = 1$

14: $\dfrac{dy}{dx} = \sqrt[3]{y}; \quad y(0) = 0$

Section 1.3, # 25 You bail out of the helicopter of Example 3 and pull the ripcord of your parachute. Now $k = 1.6$ in Eq. (3), so your downward velocity satisfies the initial value problem

$$\frac{dv}{dt} = 32 - 1.6v, \quad v(0) = 0.$$

In order to investigate your chances of survival, construct a slope field for this differential equation and sketch the appropriate solution cuve. What will your limiting velocity be? Will a strategically located haystack do any good? ~~How long will it take you to reach 95% of your limiting velocity?~~

Section 1.4, # 9, 14 Find the general solutions (implicit if necessary, explicit if convenient) of the following differential equations:

9: $(1 - x^2)\dfrac{dy}{dx} = 2y$

14: $\dfrac{dy}{dx} = \dfrac{1 + \sqrt{x}}{1 + \sqrt{y}}$

Section 1.4, # 23, 27 Find the particular solutions of the following initial value problems:

23: $\dfrac{dy}{dx} + 1 = 2y, \quad y(1) = 1$

27: $\dfrac{dy}{dx} = 6e^{2x-y}, \quad y(0) = 0$

Section 1.4, # 2, 19, 24 Find the general solution of the following differential equations (particular solution if initial conditions are given):

2: $\dfrac{dy}{dx} - 2y = 3e^{2x}, \quad y(0) = 0$

19: $\dfrac{dy}{dx} + \cot(x)y = \cos(x)$

24: $(x^2 + 4)\dfrac{dy}{dx} + 3xy = x, \quad y(0) = 1$