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

# 14: \( \frac{dy}{dx} = \frac{2}{\sqrt[3]{y}}; \quad y(0) = 0 \)

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 curve. What will your limiting velocity be? 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: \( (1 - x^2) \frac{dy}{dx} = 2y \)

# 14: \( \frac{dy}{dx} = \frac{1 + \sqrt{x}}{1 + \sqrt{y}} \)

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

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

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

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

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

# 19: \( \frac{dy}{dx} + \cot(x)y = \cos(x) \)

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