Summary on Slope Fields

Consider the first-order differential equation

$$\frac{dy}{dx} = f(x, y). \tag{1}$$

- Differential equation (1) defines a slope field by drawing a short line segment at every point (x, y) with a slope $f(x, y)$. These slope lines are referred to as the slope lines of (1).
- Every solution curve of (1) is tangent to the slope lines on the curve, and vise versa.
- In practice, it is impossible to draw the slope lines at every point; instead, draw them at any specified finite grid points.
- Constant solutions and long-time behavior of solutions may be observed in slope fields.
- Follow the closest slope lines in a sketched slope field to draw a few representative solution curves.
- In general, different solution curves do not intersect; but if they do, they must be tangent to each other at the intersection points.