

## 1 Miscellaneous

### 1.1 Concepts

1. Euler's formula tells us that  $e^{i\theta} = \cos \theta + i \sin \theta$ .

### 1.2 Example

2. Show that  $\sin \theta = \frac{e^{i\theta} - e^{-i\theta}}{2i}$ .

## 2 Slope Fields

### 2.1 Concepts

3. A slope field is a graph where at every point  $y, t$ , you draw a line with the slope there, which is given by the function  $f(y, t)$ .

### 2.2 Problems

4. Match each slope field to the differential equation and sketch some solutions to them.
5. For each differential equation, estimate  $y(2)$  using the starting point  $y(1) = 1$  and step size of  $h = \frac{1}{2}$ .



$$\frac{dy}{dx} = x - y$$

**DE1**

$$\frac{dy}{dx} = \frac{x}{y}$$

**DE2**

$$\frac{dy}{dx} = y - x$$

**DE3**

$$\frac{dy}{dx} = -\frac{x}{y}$$

**DE4**

$$\frac{dy}{dx} = x$$

**DE5**

$$\frac{dy}{dx} = -\frac{y}{x}$$

**DE6**

$$\frac{dy}{dx} = \frac{y}{2}$$

**DE7**

$$\frac{dy}{dx} = 0.25y(4 - y)$$

**DE8**

$$\frac{dy}{dx} = 2 - y$$

**DE9**

$$\frac{dy}{dx} = x + y$$

**DE10**