Slope Fields – What they are

Now let's look at **slope fields**. Integration is a system of finding the original equation, or a family of possible antiderivatives, when given the derivative. Since **the derivative is**, in fact, **the equation which gives us the slope of the tangent** line at any point along that curve, we can use the information to create a slope field.

What this is going to do is give us an etch-a-sketch-type drawing (are you all even old enough to know what an etch-a-sketch is??!!) of the slopes at different points on the xy-plane. From that, we will have an idea of what the original function looks like.

We can look at the slope field and guess that a curve that fits will look like this:

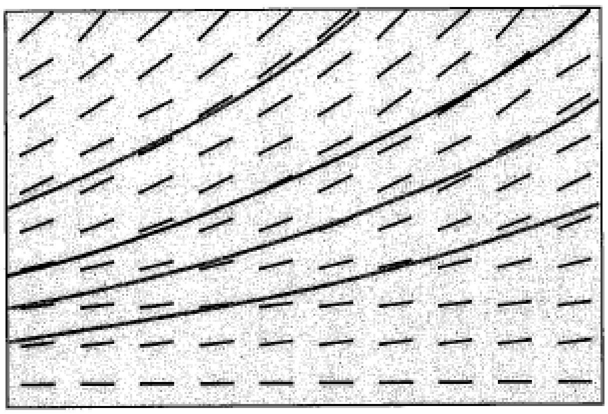
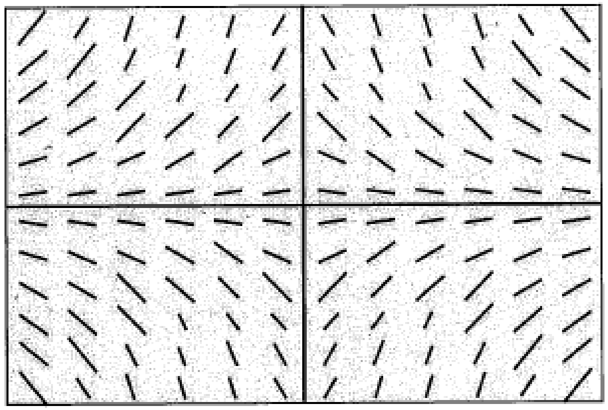


Figure 6.1 (a) A slope field for the differential equation $dy/dt = 0.056y$ suggests what its solutions look like. (b) The particular solutions for $y(0) = 50$, $y(0) = 75$, $y(0) = 100$, and $y(0) = 200$ all appear to follow the "flow" of the slope field.

Another example:



The curve might look like this:

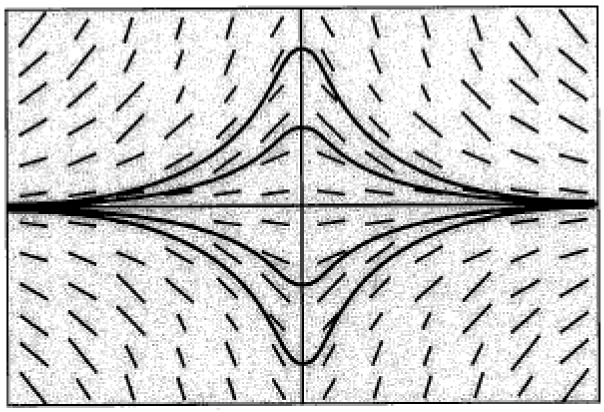


Figure 6.3 (a) A slope field for the differential equation $y' = \frac{-2xy}{(1+x^2)}$ suggests what its solutions look like. (b) The particular solutions for $y(0) = 0$, $y(0) = \pm 2$, and $y(0) = \pm 4$ all appear to follow the "flow" of the slope field.

By now, you might be wondering why we are bothering with this at all; why don't we just find the antiderivative and find out exactly what the original equation is? The reason is that all differential equations are not tidy. Some are not easily solved through our traditional methods. Slope fields give us another way to see what the original function may have been, given some information about the derivative. Coming up next, we will learn how to construct our own slope field.