

**Questions:**

1. Look at the direction field for equation (1). Where is it steepest? Where is the direction field "flattest"? What sort of behavior is associated with steepness and flatness?

2. How would the equation (1) change if  $T'(t)$  and  $T(t) - T_0$  were inversely proportional instead of directly proportional? How would the direction field for this equation appear? Can you describe the behavior predicted by this model?

3. In the figure showing two solution curves, one curve is steadily decreasing while the other is an increasing curve. Describe the temperature scenario associated with these two curves. Is there any solution curve that is a straight line rather than a curve?

4. Compute the derivative with respect to  $t$  for the following functions:  
(a)  $f(t) = \ln(t - T_0)$       (b)  $g(t) = \ln(e^t - T_0)$       (c)  $h(t) = \ln(\sin(t) - T_0)$

5. For  $T(t)$  given by equation (3) evaluate  $T(0)$ ,  $T(\frac{\ln 2}{k})$ ,  $T(\frac{\ln 10}{k})$ . For what value of  $t$  is  $T(t)$  equal to  $(T_0 + T_1)/2$  ?